THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXII. No. 2088.] LONDON, MAY 19, 1903. [55TH YEAR. PRICE 6d.

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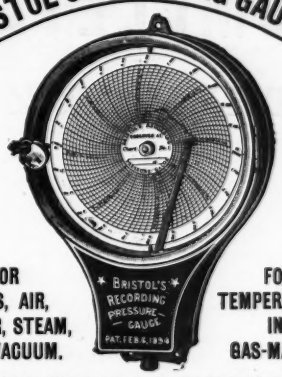

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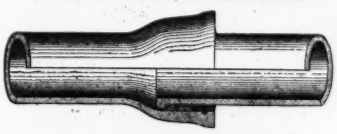

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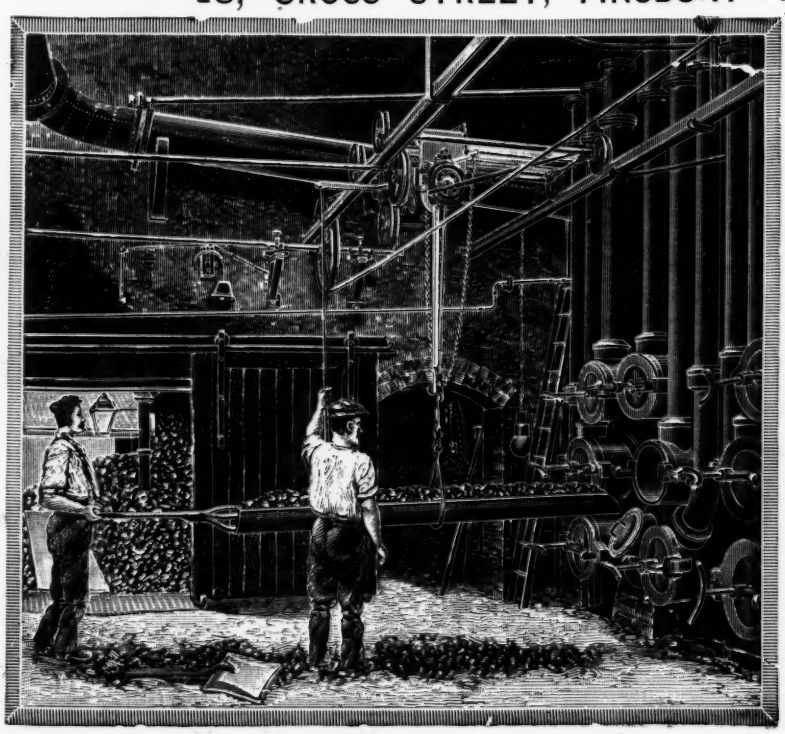

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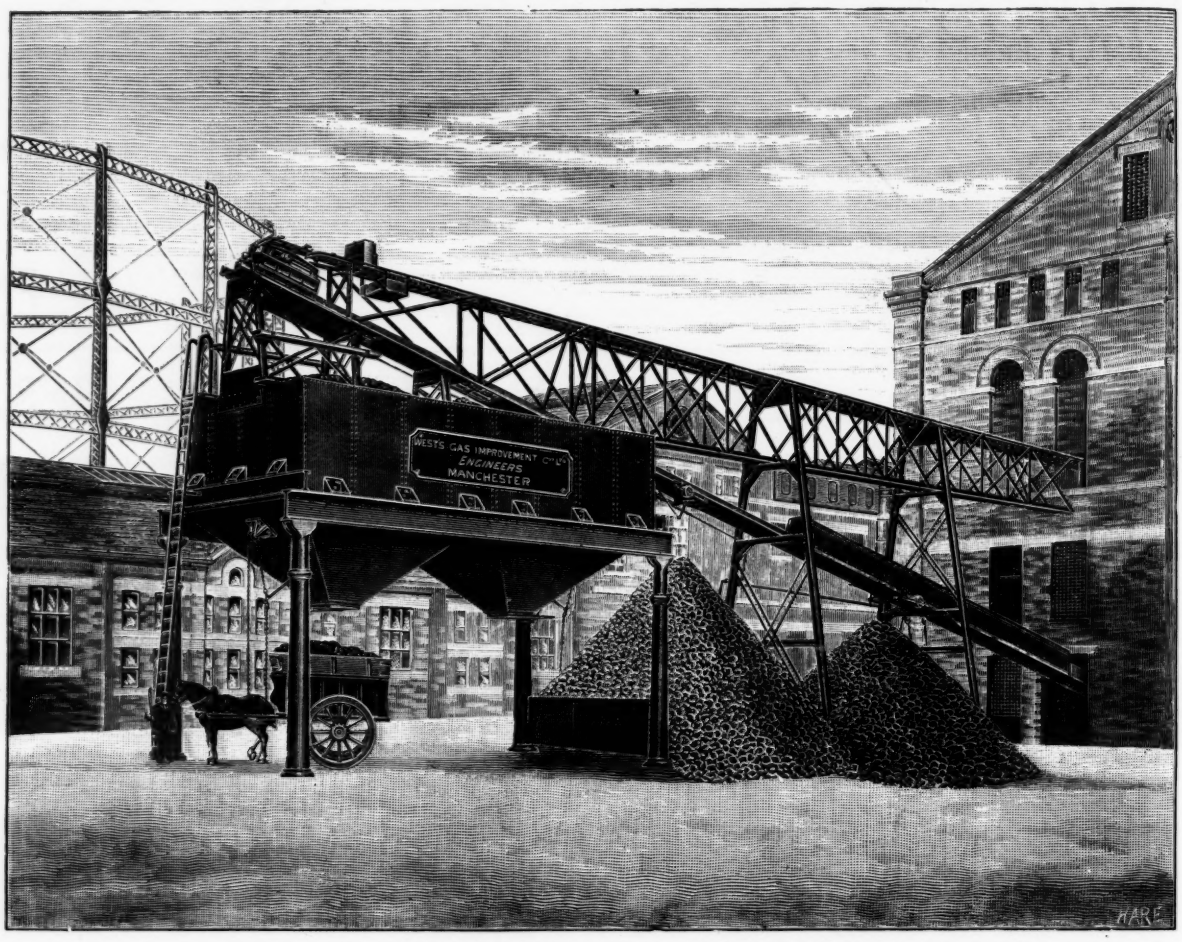

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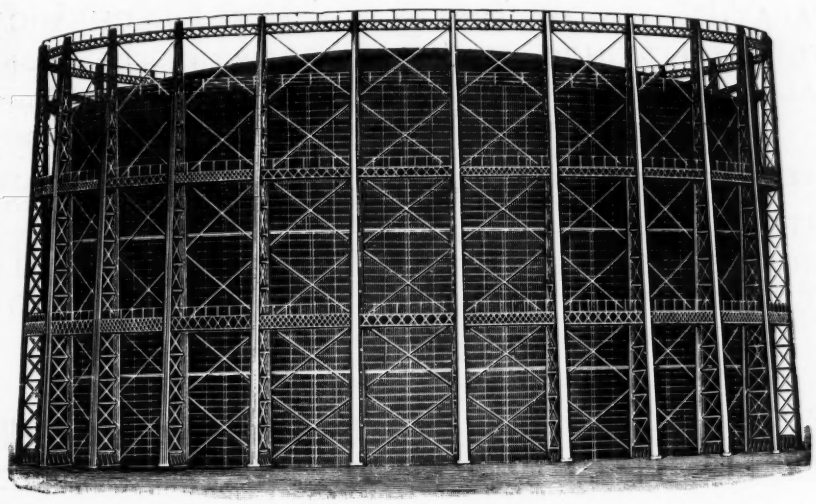

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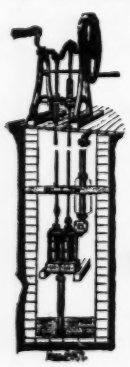

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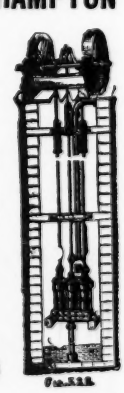

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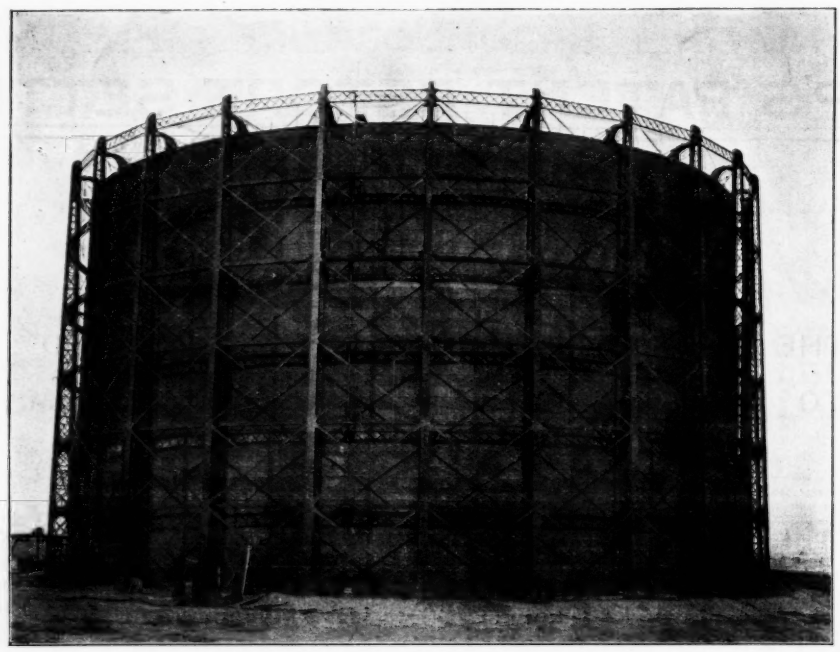

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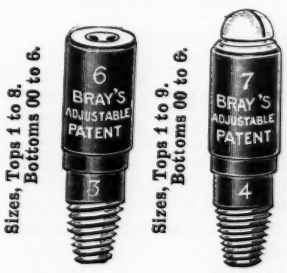

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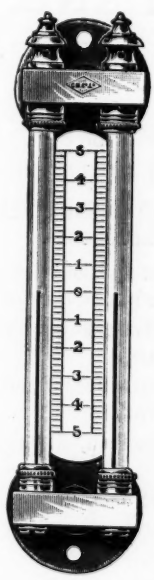

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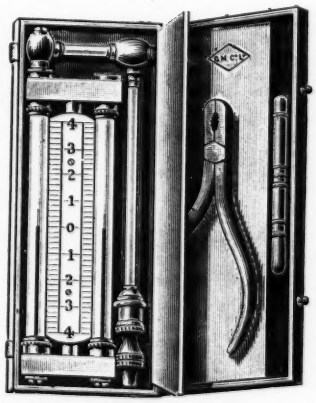

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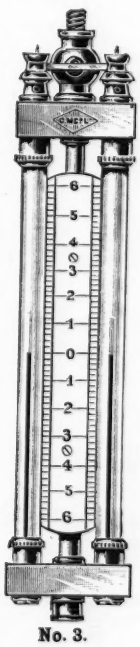

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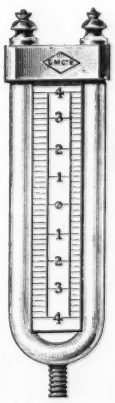

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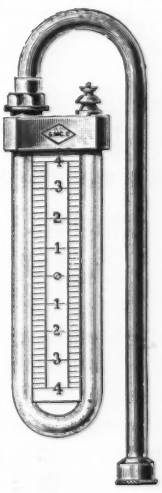

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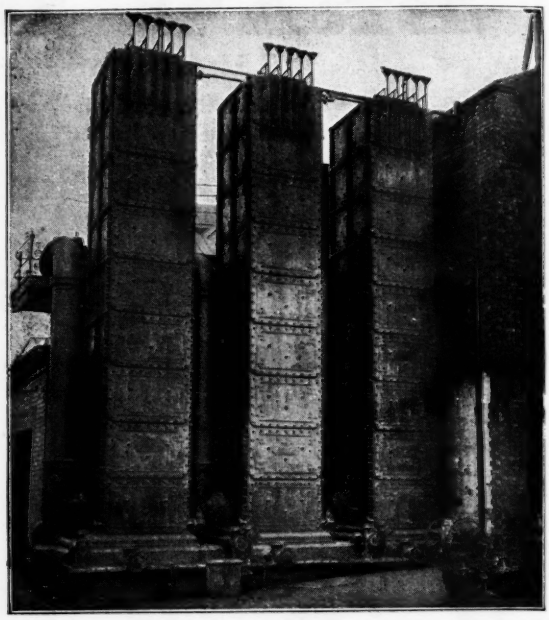

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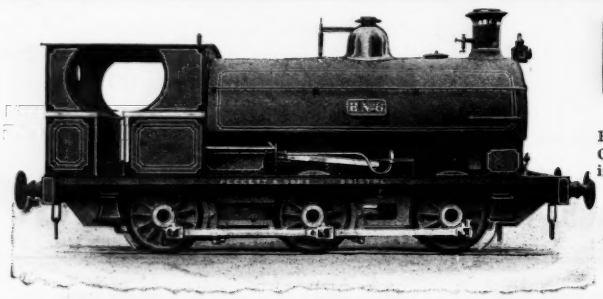

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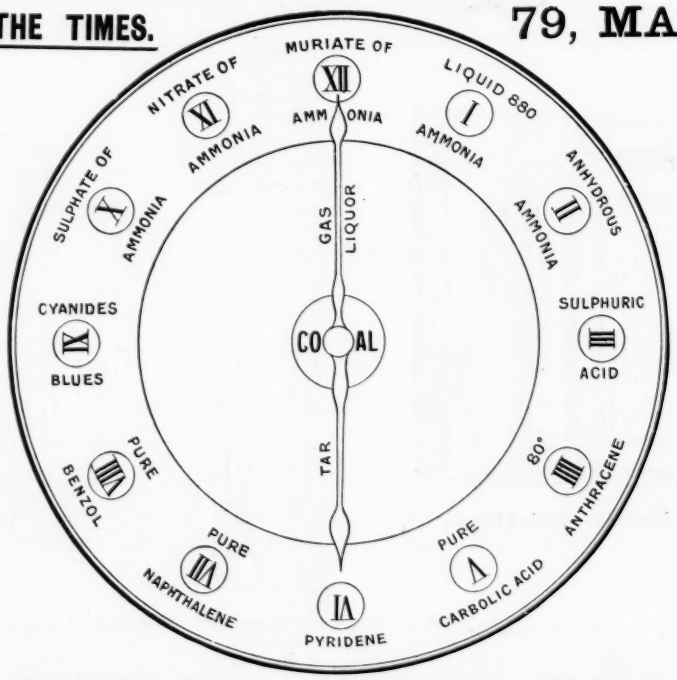

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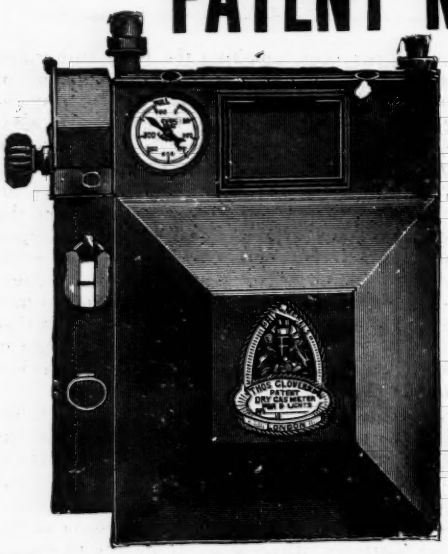

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXXII., No. 2088.—TUESDAY, MAY 19, 1903.

EDITORIAL NOTES.

The Parliamentary Success of the Gaslight and Coke Company.

On Tuesday last the open secret of the terms agreed upon by the Gaslight and Coke Company and their chief opponents before Parliament, which had been talked about in the Committee-rooms and corridor for the preceding ten days, was formally disclosed to the Committee presided over by Sir Robert Gunter, in succession to Sir John Brunner. Although the immediate effect of the agreement was to leave the Company's Bill free to proceed as a practically unopposed measure, Counsel had to be briefed to make the necessary explanations to the Committee; and the whole day was occupied in the process. As we were able to announce last week, in consequence of the publication by the Corporation of the City of London of the terms upon which their opposition to the Company's Bill had been withdrawn, the London County Council agreed to drop their Bill and raise no opposition to the Company obtaining an Act which will carry them on for a few years. The amount of additional capital is reduced under the agreement from £1,000,000 to £750,000; and the standard price comes down to 3s. 4d. per 1000 cubic feet, instead of 3s. 6d. as proposed in the Company's Bill, with no alteration of illuminating power. This appears to be a bargain which is agreeable to both sides. On the one hand, the petitioners may flatter themselves that they have beaten down the Company by a substantial figure; while, on the other, the Company are to be congratulated upon retaining a standard price 4d. per 1000 cubic feet above their actual selling rate. No Company going to Parliament for the sliding-scale for the first time would in these days obtain such favourable treatment.

It is when one proceeds to consider the conditions attached to the above resettlement, that appreciation grows of the statesmanship that inspired the Company's offer. Having determined to make peace with the London County Council while they had the chance, the Directors evidently had no mind to do the thing by halves. In the Bill it was proposed to form a redemption fund out of divisible profits in excess of 4 per cent. on the ordinary stock, by setting aside for this purpose 8d. out of every additional 2s. 8d. divisible under the sliding-scale—this being the proprietors' share corresponding to 1d. reduction in the price of gas. The process was to go on until the Board of Trade were satisfied that all obsolete capital had been in this way extinguished. By the terms actually agreed upon, the Company, whenever they are in possession of the funds necessary for the purpose, engage to set aside, towards redemption, out of divisible profits in excess of 4 per cent. per annum, a sum of £10,000. Having done this, they may declare an increased dividend up to £4 6s. 8d. If they are in a position to so set aside £20,000, they may share the rest up to another 13s. 4d. per annum. And so on up to £40,000, which is to be the consideration for permission to distribute an increased dividend in excess of £5 per annum. Meanwhile, the Company are to be absolved from the obligation to write off anything in respect of obsolete capital out of revenue. It is to be supposed that the drafting of this new clause (reproduced elsewhere) is correct; but it reads rather complicated. What we understand it to mean is, that when the Company find themselves with more money in hand, by way of divisible profits, than is enough to pay the standard dividend of 4 per cent. per annum—which is equivalent to 10 per cent. on the unconverted stock—they may divide an additional 6s. 8d. per cent. for every £10,000 which they previously allocate to redemption. As under the sliding-scale the additional dividend is 2s. 8d. for 1d. reduction in the price of gas (which reduction must be made before any increase in dividend is possible), the rate of authorized dividend at the present prices and under the new initial is four times this amount, or 10s. 8d. per cent.—making the total authorized rate of dividend £4 10s. 8d. per cent. Before a penny of this can be touched (next year), £10,000 will have to be first taken out and regarded as already distributed in dividend. It will need a long time to wipe off a million at this rate; but that is always the objection to companies' stock-extinguishing devices. On the other hand, too large an allocation laid out in this way, would seriously upset the Company's finances. The arrangement now decided upon seems to be a workable compromise between several evils. Every penny of it comes out of the proprietors' money. Those of the present generation must be content to face lean years, to make amends for the superfatted years that are past. After all, the proprietors will be glad enough to see their stock back at par; and as good 4 per cent. stock it ought to command this value on the new settlement.

A little trouble seems to have occurred over the Company's right to charge meter-rents elsewhere than in the City. As this point did not interest the City Corporation, the County Council were left to deal with it. Among the reckless prodigalities of the past, which the Company must pay for in the future, is to be counted the remission of the meter-rents. Admittedly, there was a difficulty in regard to the City, which had exemption from this charge; and the then Administration of the Company rather exaggerated the anomaly of the consumer who lived in the West End being charged meter-rent at home and not in regard to his City office. It was no worse than the far more numerous instances of men who have City offices, and live all over the country, paying meter-rent everywhere. At any rate, the advent of electric lighting must have long since convinced the Gaslight and Coke Company that it was a mistake to give up £80,000 a year, and never get a word of thanks in return. The County Council wanted the Company to definitely abandon the right to make this charge; but this cool request was not granted. At the same time, the Company were willing to declare that they had no intention of reinforcing the charge in the case of the ordinary consumers. It ought at least to be put on in the case of those "bare-need" consumers who, ordinarily using the electric light taken from a company, still demand a costly gas-meter to keep as a stand-by. Probably, however, the Company do not wish to disconnect a lot of meters, which would only take up room if brought away, so long as there is the smallest probability of them being wanted.

It was stated by Sir Ralph Littler, K.C., in opening the case for the County Council, that the happiest results had been brought about by the full and frank spirit in which the Governor of the Company, Sir W. T. Makins, Bart., had put himself into communication with the Council. It must have been obvious all along that the differences between the two Bills were such, and only such, as invited friendly conference between the respective promoting bodies. Better late than never; and the Company's change of tone has done more than anything else to win them a Bill, after three failures. The moment the Directors abandoned their impossible attitude, it became a question of degree between their requests and what the County Council were prepared to endorse on their behalf. Fresh capital was essential, especially for distribution. The greater the inroad of the electric light in the mercantile and fashionable districts, the more imperative the call for enterprise in pushing out into the suburbs. The works can be pulled round without much more capital; but stoves and mains and meters must be had. The abandonment by the County Council of their demand for a forced reduction of the illuminating power of the Company's gas from 16 to 14 candles, at the ransom price of 2d. per 1000 cubic feet, was prudent. The fact of the Company not proposing any reduction of illuminating power was due, we may be sure, to the exaggerated value attached to it. They could not afford so much, nor the half of it. This is not surprising. As we have repeatedly admitted in these columns, the worst of putting too high a price on a reduction of candle power, is to prevent companies situated like the Gaslight and Coke Company from countenancing it. Perhaps this matter also may come before the

Departmental Committee; but there are cases where any economy to be expected from reformed gas manufacture, whether as regards the saving of enrichment or sparing the useless refinements of sulphur compounds purification, ought to be borne by the sliding-scale. It is broad enough to bear all this, and more. In conclusion, we desire to congratulate the Gaslight and Coke Company on the turn of their fortunes, and trust that five years hence the improvement in the general condition of the undertaking will be found to have justified the passing of the present Bill.

Another Mond Gas Bill Passed.

The Bill of the North-Western Electricity and Power Gas Company has passed the Lords Committee, as was generally expected; and the promoters have been let off with very little diminution of the facilities they desired. Indeed, such trimming as Lord Glanusk's Committee thought fit to give to the scheme as it came before them only lops off some of the more obviously speculative developments of the main idea, leaving the promoters with everything they could legitimately claim to be desirable for the carrying out of their proper enterprise. Thus they have obtained the whole of the immense area they staked out, not one of the objecting towns has been kept out, and all the capital asked for has been allowed them. The restrictions imposed comprise a limitation of the undertakers to deal in Mond gas only; a refusal of permission to resell land acquired compulsorily, and to finance subsidiary companies or lend money; denial of lighting powers; and limitation of the time for building works to four years from the 1st of January next. This is very faithful dealing with the promoters. As they elected to traffic in Mond gas, to this particular brand of gas—whatever it may be—they are confined. The other restrictions do away with the most objectionable features of the scheme, while leaving whatever merits it may possess to make their way in this part of the world. The opposition of the local gas interest to the Bill failed utterly.

Naturally, the Committee were disposed to give the promoters, who professed to have confidence in their prospects of starting a new industry, a run for their money. Parliament reflects the general sentiment, which does not greatly respect any declaration that a new thing in science or in technics cannot be done. Vested interests always oppose novelties, of course, but very rarely with success in the parliamentary field. It is the lesson of the Manchester and Liverpool monorail scheme over again; not to mention the South Staffordshire Mond gas venture. On general principles, these shocks and shakings-up of old-established concerns are to the public advantage. Especially in the little world of the statutory gas industry, if anything can arouse subsidizing town councillors and somnolent gas directors from the comfortable dream that they have only to charge what they please and share out the profits, it is a power-gas scheme. The very suggestion that a competitor is willing to try his luck in their district, is the best thing to make these Old Men of the Sea of the gas industry tremble on their perches. If they can be brought to see that the gas industry cannot bear the burden of town improvements, or of high prices (in the case of companies) due to the piling up of capital for mere greed of dividends, Dr. Mond and his henchmen will do the established gas industry a world of good. So may it be.

We may think what we like of the prospects of power-gas distribution; and some of us believe we know that these prospects are shady. But this is not to say that we regard the older gas industry as actually serving the community to the very best advantage, or that a power-gas business would not be a good thing for the customer, although not very profitable to the provider. The whole point of the present situation consists in the way in which the administrators of statutory gas undertakings, and even their professional critics among local authorities, have misunderstood the intention of Parliament in granting their Special Acts. It is certainly not the desire of the Legislature to injure a community by granting statutory protection to a gas company or a gas-supplying local authority. If competition between gas companies dealing in the same commodity has been rejected by Parliament as a means of cheapening the supply in any locality, this is not for love of the gas company actually in possession, but only because experience has shown two gas companies in one district to be worse for the public than one. He would be a flatterer of the existing order who would contend for a moment that the absence of competition has in all cases and in every respect been good for British gas undertakings.

Indeed, if the welcome extended by Parliament to these power-gas schemes—speculative as they may be—has any ground at all, it is probably that Parliament is delighted at the chance of bringing an inspiriting whiff of competition into the staid experiences of the old companies, and is not averse to reminding corporation gas departments that they cannot charge any price they like. This, at any rate, is the stimulating way of looking at the facts. The British gas business had become too automatic. Every pushing pawnbroker who could get a handful of his local patrons to vote him on to the Town Council took to fancying himself as a born gas manager. He and his like felt no need for a competent officer in this capacity. Similarly, many gas directors never dreamt of regarding the sliding-scale as anything else than an engine for securing dividends. Capital might be increased in order that profit balances should be swelled. What did it matter? The price of gas had nothing to do with the demand for it! So the misunderstanding went on; until now the spectre of competition is appearing in one gas-supply district after another. There is not, as we have often argued, anything in this bogey to frighten those who are doing the ordinary gas business as it should and can be done—upon the sound industrial and commercial footing for which Acts of Parliament were meant to provide full and fair scope. On the other hand, those gas manufacturers who know that they are charging their customers for what is not gas at all, but parks, and colleges, and old plant that ought to have been written off long ago, may well tremble in their shoes at the ghastly appearance.

The Self-Taxation of Gas Consumers.

In the course of his reply to the Protectionist deputation which waited on him last Friday, with the object of urging upon the Government the desirability of maintaining the registration duty on corn and meal, the Prime Minister made some weighty observations on an aspect of taxation which has never received the consideration due to its great practical importance. This is the nature of the connection that should be sought, in all cases, between theories of taxation and the particular vehicle for conveying money from the various contributories to the exchequer, whether national or municipal. Taxation is universally necessary to the existence of any form of government; but in proceeding from the general to the particular, from the abstract requirement to the concrete impost, it is absolutely necessary for governments to choose such ways and means as shall command the assent of the taxed. Anyone who will take the trouble to survey the fiscal arrangements of the civilized world, however superficially, will notice in the very first place wide differences among the subject-matters of taxation, which, to the individual, are far more interesting than the amount of taxation per head of the population. Whatever degree of interest and suggestion there may be, for instance, in a bare statistical statement of the gross amount of taxation paid by a German or a Frenchman, as compared with an Englishman of the same social standing, this is nothing to the interest that attaches to the consideration of the forms and methods followed by the agents of the State in raising this amount of revenue in the respective cases.

This aspect of the subject is independent of the consideration as to whether the taxes are Protectionist or are framed according to some interpretation of the principles of Free Trade. The point is that one people, or one community, will pay certain taxes and duties, and not others. To distinguish these prejudices, and avoid offending those who hold them, is the task of the practical statesman and politician. To disregard them is the stamp of the statesman of the study and the arm-chair, who, though he be never so wise in his own conceit, very rarely gets a chance of dealing with revenue business in his own person. He may, and often does, exert an influence on the ideas and principles of the working statesman; but it is for the latter to feel his way and choose the time for carrying the people with him in fiscal operations. Mr. Balfour put this in his own words as follows: "The taxes which it is right to put on in any "country depend, and must depend, not merely on paper "considerations, not merely on the abstract arguments of "theoretical economists; they depend, and must depend, "on the tastes, the habits, the history, and the prejudices

"of the particular community on which the tax is imposed." He illustrated this by referring to the example of France, where every town has its *octroi* duties which we should not tolerate, while the National Government dares not impose an income-tax.

This lesson needs to be learnt at home, by the leaders of public opinion in those local government districts where municipal gas is taxed to subsidize the general rate fund, to help pay for various unprofitable municipal trading enterprises, to build schools, and, in brief, to effect any and every kind of purpose except that of cheapening gas to the public. How little reliance is to be placed on the force of abstract principles of Free Trade, with their supposed corollary in favour of direct and against indirect taxation, as a safeguard against this particular form of indirect taxation—taxation, moreover, of a necessary of town life, an aid to industry—is manifested by the prevalence of this practice in places where the pure tradition of Cobdenism is supposed to inspire local politics. Of course, this is inconsistency; but that imputation does no harm to an English political cause. Human nature is nothing if not illogical. The very communities who scented Protection in the corn tax are conspicuous for their toleration of the indirect taxation of their own gas. There is not on the British municipal horizon the faintest sign of an awakening of the public conscience to a sense of this fiscal error. On the contrary, every gas-supplying municipality which can rake together a surplus of profit hurries to proclaim the fact, and to take credit for it as a proof of the meritoriousness of municipal trading. The more money they lose, the greater the disappointment in regard to other enterprises, the faster do these local authorities cling to their one milch-cow, the gas undertaking. Whatever else they may fail to accomplish, they vaunt their extreme cleverness in milking this particular animal going and coming, and all the time. The only possible sanction for this form of indirect taxation is the consent of the people in whose name it is imposed. Englishmen living in such places as Manchester, Birmingham, or Leicester like it, just as the French and Italians cherish their *octroi*. No other explanation of the fact is possible. It is very generally said in Germany that the Kaiser can do whatsoever he likes, except put a tax on tobacco. While the French boggle at an income-tax, there is a local one in Holland. America is a land of the free; yet the United States tariff is a fiscal atrocity which none but Americans would suffer. "That," as the Prime Minister observed, "shows that you cannot "settle these questions apart from sentiments and feelings "which are of historic origin, though the feelings are per-"fectly illogical, as feelings often are." One would hardly have regarded taxation as a matter of sentiment, but there is plainly no truer light in which to view the subject in its practical bearings.

The Labour News of the Week.

MENTION was made here last week of the rebellion of the members of the engineering trade in the North against the Executive of the Amalgamated Society of Engineers, who had ordered them to go on working at reduced wages. It has since transpired that the strikers in several places have rather repented of their precipitancy, and returned to work; while at a further conference held in York last Wednesday it was agreed that the men should continue working at a reduction of 2½ per cent. on piece rates and 1s. per week on time rates until August, when there will be another meeting to reconsider the position. This is a splitting of the difference between the employers and their hands, and may or may not answer the purpose. Meanwhile, it is well to observe once more how very different is the lot of the workmen who are subject to these fluctuations of pay and of employment, from that of the men engaged in any department of a gas-works. Wages in gas manufacture are never reduced, and work is never stopped.

It is often pretended that Trade Societies act beneficially for their members, by forcing up and keeping up wages. This contention has never been, and cannot be, proved. It is pretty safe to conclude that, if it were in the power of Trade Unionism to prevent them, these fluctuations of employment and rates of pay would never be permitted by the Amalgamated Society of Engineers. That they do occur is sufficient proof of their inevitability. On the other hand, the steadiness of employment and rising wages of gas workers, and of the followers of the greatest of the "unorganized" employments—field labourers and domestic servants—is a tolerably clear indication that Trade Unionism is not necessary to the amelioration of the lot of the wage-earner. And where a thing is superfluous it is liable to degenerate into a nuisance. Trade Unionism as a principle experienced a bad shaking last week, when the railway men of Victoria attempted, by a sadly reckless strike for the "principle," to paralyze communication and upset the Colonial Administration. But instead, it is they who have been reduced to impotence, by the boldness of a Minister who proposed to bring all Labour organizations under a new repressive law more drastic than any old community would favour. The incident shows once more that firm handling of industrial nettles is the best treatment for these troublesome weeds.

A Check to Municipal Muddling at Plymouth.

Nemesis has overtaken the Plymouth Corporation. For years past that body has been pursuing a spendthrift policy; embarking on schemes which it had no means of paying for, and piling up debt in the reckless manner which distinguishes Progressive Municipalism in its worst forms. Nearly two years ago, the Borough Treasurer pointed out that the town was living in a "Fool's Paradise," and earnestly impressed upon the Council the necessity not only of using the greatest economy, but of carefully considering the financial results of any new schemes before embarking upon them. At that time the Corporation had overdrawn their account at the bank by nearly £200,000, and had exceeded their statutory borrowing powers by a quarter-of-a million; while there were no fewer than nineteen suspense accounts, representing items of expenditure which the Corporation had held over from year to year instead of charging to the current rate account. The two years which have elapsed have done little to improve the financial situation. In one respect it is decidedly worse; for a great scheme of main drainage (which is approaching completion) has come to £200,000, instead of the £100,000 which it was originally estimated to cost. Generally, however, things had got into such a muddle that it was decided to apply to Parliament for relief; and the Corporation have lately had the benefit of learning what a Special Committee of the House of Commons think of its methods.

The Protective Power of Parliament.

As originally drafted, the Omnibus Bill which the Corporation decided to promote contained a variety of provisions relating to all sorts of enterprises. Still, its main purpose was to enable the Town Council to get over their financial difficulties. This was to be done by enlarging the borrowing powers in regard to matters where they are now restricted, and by obtaining an extension of the period for the repayment of certain loans. It was said that in this way immediate relief to the extent of about 5d. in the pound would be given to the ratepayers. The expedient, nevertheless, seems to have been regarded as a desperate one. At a very early stage in the proceedings, the Council reluctantly unloaded its omnibus. All the provisions of the Bill relating to sanitary matters were discarded on the advice of the Town Clerk, who frankly told the Council that the financial clauses would be greatly jeopardized if the Bill came before the Police and Sanitary Committee of the House of Commons. But, though in this way the Charybdis of the Police and Sanitary Committee was avoided, it was only that the Corporation might run upon Scylla when they actually did come before a Parliamentary Committee. The opposition to the Bill by certain local ratepayers and others was keen and determined; and the Committee were evidently impressed from the outset with the seriousness of the situation which municipal mismanagement had created for Plymouth. After a long hearing, they sent the Corporation back with their Bill, with instructions to amend the preamble by inserting in it a recital of the various suspense accounts and other financial illegalities for which relief was being sought. Having got this, the Committee decided that the preamble could only be passed on the condition that the Bill contained a clause providing for the audit of the borough accounts by a District Auditor appointed by the Local Government Board. The representatives of the Corporation resisted this long and strenuously. Municipal corporations of the Progressive sort do not like the

idea of being bound to the strict letter of the law by Government supervision. But the Committee were not to be shaken from their purpose. What was good enough for the London County Council, for the Metropolitan Boroughs, and for Tunbridge Wells was good enough for Plymouth; and Plymouth might take its Bill *plus* the audit clause of the Tunbridge Wells Improvement Act, 1890, or it might let the Bill go. The possibility seems to be that the Bill will be dropped. This will mean a continuation of the financial embarrassment of the borough; but the Council, who are responsible for this unhappy condition of things, may be trusted to go to great lengths before they submit to the supervision of an authority who may exact penalties for such irregularities as have caused the town so much trouble. There is, of course, another way out of the town's difficulties. The Corporation might raise the rates by such a sum as would in one or two years pay off the suspense accounts, and might then set themselves resolutely to the reduction of their other outstanding liabilities. But this is not the course which the Corporation are likely to pursue. High rates are unpopular, and the Plymouth Corporation, who cannot now be in particularly good odour, will not add to the rates if they can help it.

The Public Lighting of Liverpool.

With reference to the notice which appeared in these columns last week of a remark made by Alderman Petrie to the Liverpool City Council, to the effect that to introduce electricity for the public lamps in all the streets would mean a lighting rate of 2s. in the pound, as against 4d. in the pound at present, we find that the Alderman has thought it necessary to write an explanation to one of the local papers which appeared to doubt the accuracy of the statement. Alderman Petrie, who, as ex-Lord Mayor and a member of the Gas and Electricity Committee, should be in possession of all the facts, says he did not intend to convey that electric lighting is six times as costly as gas, because figures quoted demonstrated the annual charge to be rather under twice as much. But in addition to this a large capital expenditure would be involved, amounting at the lowest estimate for the 425 miles of city roads to over £750,000, and if the present method of meeting all capital expenditure out of the rates were continued, and the change carried out over a period of five years, the annual expenditure during that time would be in the neighbourhood of his rough estimate. We may take it, then, that the best that can be said for electricity in Liverpool is that if it were used for all the public lighting it would for five years cost six times as much as gas, and thereafter rather under twice as much. Bad as this is, however, the Alderman endeavours to make the case of electricity even worse by saying that the Corporation consider the price they pay for the gas (than which it is so much dearer) is high! In this, he does an injustice all round; for the charge made by the Company for gas of 20-candle power is no more than 2s. 4·8d. per 1000 cubic feet. Still, the Company are no doubt willing to be judged by results, and these are quite striking enough to merit the publicity which Alderman Petrie has accorded them.

By Incandescent Gas-Lamps.

The reorganization of the street lighting in Liverpool was commenced in 1896, when electricity and incandescent gas were carefully considered and tested. The result was that the Lighting Committee (who, of course, own the electricity works) adopted 4 miles of arc lighting and about 400 miles of incandescent gas lighting. This extensive work was carried out over a period of five years, without any increase in the lighting rate or the raising of any capital to meet first cost, which was entirely defrayed by the economy effected. In 1893, there were 11,122 lamps, which cost £40,881; whereas in 1901, there were 15,398 lamps costing £44,852. The figures for the latter year include the lighting of the townships added to the city in 1895, the cost of which at that time amounted to £7194. Adding this to the cost in 1893, it will be seen that the charge in 1901 was £3223 less; and yet the aggregate illuminating power of the street lamps was 300 per cent. greater. To still further emphasize the superiority of gas, Alderman Petrie instances two streets, one of which is electrically lighted at a cost of £491 per mile (reckoning the current at 2d. per unit), while the other is better lighted by incandescent gas at a cost of £283 per mile (reckoning the gas at 2s. 4·8d. per 1000 cubic feet). These facts, he thinks, "establish the proposition that electric lighting cannot be economically or usefully extended under present conditions in Liverpool." We quite agree with him.

Bradford Street-Lighting and the Rates.

The way out of a difficulty known as "splitting the difference," is at all times an unsatisfactory proceeding. It pleases nobody; and, on one side at any rate, it usually involves the sacrifice of a principle. Something of this sort has happened at Bradford over the question of defraying the cost of the public lighting. Last year the Corporation decided (what most other places decided long ago) that the consumers of gas should not be called upon as such to pay for the public lighting of the city, but that the burden should fall upon the ratepayers generally—which may be a very different thing indeed, seeing that under the former arrangement those who use electricity contribute nothing at all towards the cost of the public lamps from which, of course, they derive equal benefit with other people. The Corporation having, by the resolution referred to, admitted the unfairness of the old state of things, one would naturally have expected them to have relieved the consumers entirely of the charge hitherto made upon them. This, however, they have not seen their way to do—either because their courage failed them or because they wish gradually to accustom their constituents to the change in policy. All they have done is to grant a sum of £21,000 from the general district rate "towards" the cost of the street lighting, leaving the Gas Committee to find about £10,000 to make up the total amount. Though the consumers are to be congratulated upon receiving even this measure of relief (which resulted last year in an immediate reduction of 3d. per 1000 cubic feet in the price of gas), a compromise of this kind, as we have already remarked, cannot be wholly satisfactory to anybody concerned. The reason given by the Chairman of the Finance Committee for the inconsistency shown is that the consumers would not benefit by the granting of the additional £10,000 out of the rates, because the working of the undertaking this year is not expected to realize a profit, and so a reduction in the price of gas would anyway be impossible. It is a little difficult to follow this reasoning. If the working should result in a deficit, consequent on the undertaking having to bear this share of the expenditure on public lighting, the price of gas will doubtless be raised. Who shall say that the consumers will not be worse off under such circumstances than they would have been had the department been relieved of the drain of £10,000 upon its resources? When the Gas Committee are able to announce a corresponding reduction in price, the Finance Committee may, it is said, vote the additional sum asked for; but no hint has been given as to what will be their attitude if the charge for gas has to be increased. The Gas Committee, however, may be trusted not to allow the matter to remain as it is any longer than can be helped.

Pearson Chalk Gas.

There will be noticed among the "Applications for Patents" in to-day's number of the "JOURNAL," one by Mr. Richard Pearson for "Improvements in the Method of, and Apparatus for, the Manufacture of Lime and Fuel Gas." (No. 10,624; May 9, 1903). Mr. Pearson is the enterprising and optimistic Managing Director of the Natural Gas Fields of England, Limited, whose operations have during the last little while secured a very fair amount of attention in the Press; and we are indebted to the "Sussex Daily News" for some particulars regarding the proposal. Our contemporary begins by referring to the natural gas supply at Heathfield, as to which it truly says: "The only question in the mind of the public has been, 'How long is it going to last?'" Time alone can answer this; but ere time has had an opportunity of doing so, we are assured it has suddenly ceased to be a question of importance. If that is the case, perhaps it is as well, for it may prevent the factories, streets, and houses of Sussex (when the use of natural gas should have become general in that part of the country) being one fine day thrown into confusion by the sudden giving out of the supply. We know that natural gas wells and petroleum "gushers" have a knack of ceasing to flow at very short notice—and generally with results the reverse of unimportant. It is therefore reassuring to learn that Mr. Pearson has in view the obtaining of gas from an absolutely inexhaustible

source—chalk. It is said that both Professor C. Vernon Boys and Mr. W. J. A. Butterfield have pronounced the invention to be an unqualified success; and knowing how well fitted these gentlemen are to form an opinion on such a subject, we shall be interested to hear further of the matter. It is claimed that while this chalk gas will be from 25 to 30 per cent. better than ordinary gas for heating purposes, it can be produced at so small a cost that it can be sold at the rate of 2d. per 1000 cubic feet; while the price of lime will be reduced from approximately 12s. 6d. to about 5s. 6d. per ton. With every 100 tons of chalk will be mixed about 10 tons of coke or coke breeze; and from this 10½ million cubic feet of gas will be obtained. After the gas leaves the lime kilns, it will pass through a series of converters and regenerators, which will be blown up to a great heat; and all the power for this purpose will be generated by the waste heat from the various processes. The calorific value of the gas is given as 52½ units per cubic foot; and the chemical analysis is stated as follows: Carbonic oxide, 44 per cent.; hydrogen, 20; carbonic acid, 6; and nitrogen, 30. Our contemporary says it is highly probable now that, instead of supplying gas to Eastbourne and other places from the natural gas supply at Heathfield, a plant will be laid down for the manufacture of "Pearson gas." It is impossible not to sympathize with the natural gas which has been thus cruelly thrust into the background, before it has had a fair chance of showing what it really can do.

The Educational Value of Cheap Gas.

Residents in districts about to be invaded by power-gas schemes will be particularly interested in the paper on "Natural Gas as a Factor in the Artificial Gas Business," which was read before the Ohio Gaslight Association, by Mr. Stone, of Ashtabula, and the consequent discussion, published in abstract form last week (*ante*, p. 370), as showing that even with a supply of fuel gas at 1s. per 1000 cubic feet, there is still something to be done in artificial gas. A natural gas company is in the same position as an artificial gas company—it is able to pay all manufacturing costs by means of the residuals, and power gas can scarcely be produced in England under such favourable conditions. But an interesting side-matter is the effect of cheap gas as a means of educating consumers in the advantages of gaseous fuel as compared with solid. Sometimes this has been provided by cut-throat competition between rival artificial gas companies, as well as by the supply of the natural article; and in either case the effect is to create a "boom" in gas that is not dissipated when the source of cheap gas is stopped, and that does not confine its beneficial effect to the immediate neighbourhood. Things would have to be in a somewhat desperate state in the gas industry before such a drastic method should be resorted to as a reduction below actual cost, and selling at a loss for a year or two as a means of advertising the advantages of gas, though we question whether such methods are altogether unknown to electricians. There are other and cheaper ways available in the coal gas industry. But the point is of general interest, if only as an illustration of the proverb that "it is an ill wind that does not blow somebody some good."

WATER AFFAIRS.

Afforestation of Watershed Areas.

REFERENCE has been made in the "JOURNAL" on several occasions to the efforts which are being put forth in some parts of the country to profitably utilize watershed areas by planting them with trees. It may be remembered that the Water-Works Committee of the Halifax Corporation were some months ago advised that afforestation of the gathering-grounds of their Ogden and Mixenden reservoirs would be beneficial alike to the quality and the quantity of the water supply; and such a course has actually been pursued on a large scale at Swinton, one of the new water-supply districts of Leeds. During the sittings of the Departmental Committee appointed by the Board of Agriculture to inquire into the subject of British forestry, some valuable evidence was given by the Water Engineer of Liverpool (Mr. Joseph Parry, M.Inst.C.E.) in regard to the work undertaken by the Corporation to afforest the catchment area round Lake Vyrnwy. In their report, the Committee have expressed the opinion that a considerable amount of afforestation might be usefully carried out in connection with gathering-grounds. They point out that it would be both advantageous and profitable to undertake work of this kind, as the trees would ultimately not only contribute materially to the retention of the rain falling over the area, and thus assist in regulating the supply by preventing floods and famines, but also tend to the purification of the water. Apart from this, the Committee thought the afforested area should, if well managed, yield a fair and regular income on the capital expended.

We are not aware that, beyond the places already named, Birmingham, and possibly a few others, systematic afforestation is being carried out in connection with water undertakings in this country; but we learn from the "Engineering Record" that it is to be done on scientific lines on the watershed of the Higby Mountain reservoir at Middletown (Conn.). The Departmental Committee above alluded to recommended that a catchment area utilized in the way indicated should be placed under the control of a competent forester; and certainly expert knowledge is highly necessary. It appears that this is being done in the case under notice. The State Forester, Mr. Walter Mulford, visited the watershed in the spring of last year, and made a proposition which eventuated in an agreement being entered into between the Board of Water Commissioners and the officials of the Agricultural Experimental Station at New Haven, whereby a careful study of the lands owned by the city, and not at present wooded, will be made, and a scheme drawn up for their afforestation. Detailed plans are also to be prepared for the management, on forestry principles, of the Higby Mountain watershed. In return for this work on the part of the staff at the station, the city authorities agree to expend $200 annually for a term of five years, in carrying out the planting, and likewise to pay the travelling and the lodging expenses to and from New Haven of one man while engaged on the work. The duty has been undertaken by Mr. Mulford himself; and he has already investigated the existing conditions on the various tracts of land.

This co-operation of a professional forester and the staff of an agricultural experimental station in the work of afforesting a watershed area gives effect, to a certain extent, to a suggestion thrown out by the Departmental Committee towards the close of their report. They remarked that, inasmuch as the afforested areas would be under corporate control, and consequently less subject to changes of management than land owned by private individuals, there was no reason why they should not ultimately serve as demonstration forests, and be available for the instruction of students. The suggestion may be worth some further attention. The primary object of the supplier of water, however, is to ensure its purity; and the more thickly his catchment area is planted with trees, the less likelihood will there be of his sources becoming polluted by animal contamination.

Masonic.—The many friends of the late Mr. T. W. R. White, of Sherborne, will be glad to know that, as the result of efforts put forth on her behalf, Mrs. Sophia White, the widow, was last Friday elected as an annuitant of the Royal Masonic Benevolent Institution for Aged Freemasons and Widows of Freemasons. Altogether 3091 votes have been polled on Mrs. White's behalf—a result for which she begs us to offer her warmest thanks.

Municipal Ownership and Public Franchises.—With the view of having the question of municipal ownership thoroughly considered upon its merits, the Committee on City Affairs of the Reform Club of New York towards the close of last year issued invitations to the various organizations concerned to send delegates to a national convention on the above-named subjects. The idea was well received, and the convention was held in the assembly room at the club from the 25th to the 27th of February, under the presidency of Mr. John C. Agar. The papers read dealt with every phase of the municipal question; and these, with the report of the proceedings, occupy the whole of the current number of "Municipal Affairs."

Gas-Engine Pumping Plant.—Early last winter we recorded the opening of water-works at Madeley, in Shropshire. They are not extensive, but they afford an interesting example of the use of gas-engines for pumping. There are two, each of 90 brake horse power, and fitted with tube ignitors. Each engine has two fly-wheels, and drives the pumps by means of belts. They are in duplicate, and consist of two sets of three-throw deep-well pumps, 10½ inches in diameter and 24-inch stroke, each capable of lifting 20,834 gallons per hour from the well 143 feet deep, and delivering the water into a tank below the engine-room floor, whence at the same time another set of three-throw pumps, 9½ inches in diameter and 24-inch stroke, also in duplicate, lifts it 342 feet through the rising mains to the reservoirs.

ESSAYS AND REVIEWS.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see page 465.)

MOVEMENTS on the Stock Exchange last week were again to a great extent dominated by the big Transvaal Loan. Attention was largely distracted away from other departments, and the advent of settlement week kept fresh business down to a low level. Everything fell flat; but before the close there was a marked disposition to recovery. In some lines, things were very good—the Foreign Market being conspicuous. In the Money Market, there was pronounced ease; and the Stock Exchange requirements had little effect on the abundant supply. Discount rates were fairly steady. Business in the Gas Market was a good deal quieter than the week before; and it was not so much confined to one or two lines—some issues coming into prominent notice which had been much neglected for the past few weeks. There were not many changes in quotation; and the general tendency was firm, despite the fact that one or two issues which had perhaps been run up rather too vigorously had to climb down a point or so. In Gaslight and Coke issues, there was plenty of activity still to be noted, getting brisker as the week went on. The ordinary commanded steady prices throughout; but at the close it was beginning to fluctuate, and the quotation dropped a point. The top price was 88¼ on Monday, and the lowest 86⅛ on Saturday. The secured issues were moderately busy, but not very strong; and the preference finished a point lower. Very little was done in South Metropolitan; and it did not show any disposition to move. Nothing at all was marked in Commercials. In the Suburban and Provincial group, there was, if possible, rather less than ever doing; but prices advanced. Brighton original gained 3, Southampton profited on *ex div.* adjustment, and locally Liverpool "B" had a further advance. In the Mart, on Tuesday, a further issue of Tottenham "B" found ready purchasers at figures considerably higher than the quotation on the Stock Exchange. Crystal Palace was also prominent in the public view last week, having accomplished a most satisfactory passage of its Bill through the Parliamentary Committee. In the Continental Companies, there was quite a reawakening of Imperial, which advanced 3, the best price being 203 *ex div.*; and Union was inclined to be better. Nothing occurred to note in connection with the remoter undertakings. The Water Companies had a very busy time, especially those which stand to gain most by being taken over. Prices had been very cautiously advanced; but last week there was no disguise about the position, and Southwark scored a rise of 47½.

The daily operations were: Gas opened pretty active and firm. Imperial rose 1. Business was a little quieter on Tuesday. Brighton original gained 3. Wednesday was the quietest day of the week. Imperial rose 1 more. Southwark Water advanced 3. On Thursday and Friday, Gas stocks did not move. But Southwark ordinary rose 14½, and ditto "D" 5 on Thursday. And on Friday, Grand Junction, Lambeth, and both Southwarks moved up 5, and East London 2. Saturday was a very active day. Gaslight ordinary and preference fell 1 each. In Water, Southwark rose 25, New River and both Lambeths 5 each, Grand Junction 3, and West Middlesex 2½.

ELECTRIC LIGHTING MEMORANDA.

The Campaign against Electrolysis—A New Protective Clause—A French Instance—The Leakage of Gas-Mains.

A GOOD deal of quiet work has been done during the last week or two in defending gas-pipes from electrolysis. Many electric tramway and lighting schemes in Parliament have been opposed on this ground, with varying degrees of success. The most important positive gain seems to have been obtained as the reward of concerted action taken in regard to their respective local interests by the Preston Gas Company and the Exeter Gas Company. Both Companies decided to pursue the same object by identical means; and the result has been, as we are informed, satisfactory. The following agreed clause, inserted in the Exeter Corporation Tramway Bill, will convey the measure of the statutory protection that has been secured: "The Corporation shall make full compensation to the Exeter Gaslight and Coke Company for any loss or damage which may occur to their mains, pipes, and apparatus by fusion or electrolytic action caused by the exercise of any of the powers of this Act conferred upon the Corporation." This is the same clause that was inserted, also by agreement, in the South Wales Electrical Power Distribution Act, 1900. It does not differ materially from the clause inserted by the Committee of the House of Lords in the London County Tramways (Electrical Power) Act, 1900. In these cases the damage provided against was anticipated; but now the Preston Company are in possession of evidence of its realization in their own experience, which we hope to be able shortly to make public. The new clause may be compared with the Sheffield clause. The point still appears to be that this liability to compensate gas companies for damage by fusion or electrolysis must still be fought for in every case by those concerned. Otherwise, it will not be imposed upon undertakers of electricity supply. It is understood to have been inserted by agreement only, with the single exception of the London Tramways (Electrical Power) Act, 1900, already cited, in which case it was admitted on petition by a House of Lords Committee presided over by Lord Camperdown. It is most important that gas and water companies should be cognizant of this record, which is preserved in Mr. Shiress Will's book on the law of electric lighting, traction, and power. There is perhaps a prevailing belief among the owners of property likely to be affected by electric leakage that the Board of Trade will sufficiently protect them; but this is an error.

Gas companies in France are waking up to the danger of electrolysis and fusion; and a paper on a gas explosion in Lyons last winter, due to this cause, was read by M. Bouvier at the recent meeting of the Société Technique. The author points out that contacts of electric conductors with gas-pipes are likely to be even more dangerous than effects of stray currents, or electrolysis, and are extremely difficult to wholly avoid. In the case in question, an extraordinary risk was incurred at the instance of the municipality, who ordered all the public gas-lamps to be affixed to the posts which carried the suspension wires for the trolley line. Somehow, a short circuit established itself between the trolley wire and one gas-lamp, which produced a shower of sparks, and simultaneously there was an explosion of gas in the third-floor tenement of a house opposite. It appeared that the electricity got at the rising pipe which supplied this apartment with gas, after the manner of French domiciles. In the end an amicable settlement in the matter of damages was made by the Tramway Company. Happily, the amount of injury done was not large, or some awkward questions of responsibility might have arisen. Evidently, it is not good practice to fix a gas-lamp upon an electric tramway wire standard; and how the ultra-scientific and careful French authorities came to do such a thing, may well excite surprise. The fact of the escaping electricity electing to strike this particular tenement is explained by the supposition that the gas-main into which it entered by way of the lamp service was "bad earth." Consequently, the current took the way of the house service, and continued along the rising pipe until it arrived at the consumer's meter on the third floor, where it encountered sufficient resistance to make it fly off to a neighbour's water-pipe.

It is rather a remarkable coincidence that while gas engineers have been stirring themselves to protect the property confided to their charge from injury by electricity, the editorial mind of the "Electrical Review" has been exercised over the danger of leakage from gas-mains. In the current issue of our contemporary, there appears a pertinent article upon this subject, which is plainly intended to carry the war into the enemy's country, by making it appear that gas leakage from street-mains is a very serious matter indeed, and one against which it behoves electricians to be on their guard, both as to the law and the facts. It is asserted that "the condition of the gas-mains all over the country, and especially in towns where they have been underground for long periods, is very bad—as anyone can judge who approaches an opening in the streets where the earth is being disturbed in their vicinity." After drawing attention to the law of the subject, as contained in the Gas-Works Clauses Act, 1847, the writer goes on to remark that "in the official accounts of electricity supply undertakings, the difference between the current generated and that accounted for is rightly considered of some importance, and it is of equal interest to study the returns from all gas undertakings giving similar information as to the quantity made and sold. If these records of the escape of a dangerous explosive were published, it might prompt an examination by a Government Inspector into the condition of gas-mains, which would be very instructive." Our contemporary is disturbed in vain. The information craved for is extant, and there is not the slightest difficulty in the way of ascertaining the actual quantity of the unaccounted-for gas in the case of any considerable gas undertaking. The figure usually lies somewhere between 4 and 6 per cent. of the total production. The corresponding proportion in the case of electricity distributing undertakings is, we believe, usually about 25 per cent., or even more. Of course, there is a difference between the two kinds of business, inasmuch as the gas which is not accounted-for is a substance, whereas the electricity which fails to get itself accounted for is not. Yet in a sense, unaccounted-for gas is as unsubstantial as the ether itself, being to a large extent only a name. Under this head are collected all the shortcomings of every measurement, whether instrumental or estimated. It is true that some gas-mains are in a poor condition, chiefly attributable to the nature of the ground in which they lie. Some old pipes, also, were hastily and cheaply laid. But their time for replacement by larger and better ones comes sooner or later. It is not usually found that modern coated mains become offensive, even in clay. The prevention of this objectionable effect of main-laying is one of the minor points of good gas management that are not neglected just now.

Mrs. Andrew Stephenson asks us to thank the numerous correspondents who have sent letters of sympathy with her in her recent bereavement, and to say that she regrets her inability to answer them all individually.

THE NEW PARISIAN RETORT CHARGING-MACHINE AND DISCHARGING-RAM.

The Unsettled View as to the Future of Retort-House Plant.

If the period of the polemical disputations on the subject of the firing of retort-settings be excepted, no time in the history of coal carbonization for the production of gas has presented the interest of to-day, when all around invention and new experience bid the engineer to pause, reflect, and examine well, before taking the first step that will carry him from his existing plant and methods of working. It is idle to close the eyes to, or refuse to recognize, the obvious. The movements that have recently been made in the simplifying of the charging and discharging of horizontal retorts by the aid of machinery, with a reduction of the cost of installation and operation, has indubitably brought the contest between the systems of inclined and horizontal retorts to a more acute stage. Methods and men's opinions are all subject to the laws of progress; and both must bow to that progress, or the consequences be suffered.

What do we find to-day? Men of high standing in the gas world and erstwhile of pronounced opinions on these subjects of carbonization by one or other of the systems, are confessing to a temporary suspension of their former positive views. One gas engineer whose propensity has been prominently on the side of inclined retorts voluntarily admits that the attractiveness of new charging-machines imposes on him, as the technical adviser in gas matters of those who engage him, a moral obligation to test samples of one or more of these machines on horizontal retorts before definitely committing himself further. A Continental engineer, whose inclined retort work is a marvel in completeness and efficiency, has personally stated his view that, in the present state of things, circumspection demands that provision in carbonizing plant for only a safe margin ahead should be made, and not more; and that is the rule upon which he is at present working. Again, in a recent communication, Mr. F. D. Marshall, of Copenhagen, writes: "In the face of my previous strong advocacy of the inclined retort system, it seems odd that I should ever be called on to mete out conscientious and unqualified praise on a machine stoker." But so it is, as will be shown hereafter. *Tempora mutantur!* Again, an engineer of eminence, whose opinons are ever held in the highest respect, does not hesitate to express the view, from a personal inspection of the new charging-machines that are now offered to the gas industry, that, "if they continue to act as they are doing now, the day of inclined retorts is past." This perhaps is putting the position strongly and definitely. However, these are the opinions of men who have been, and may still be in two or

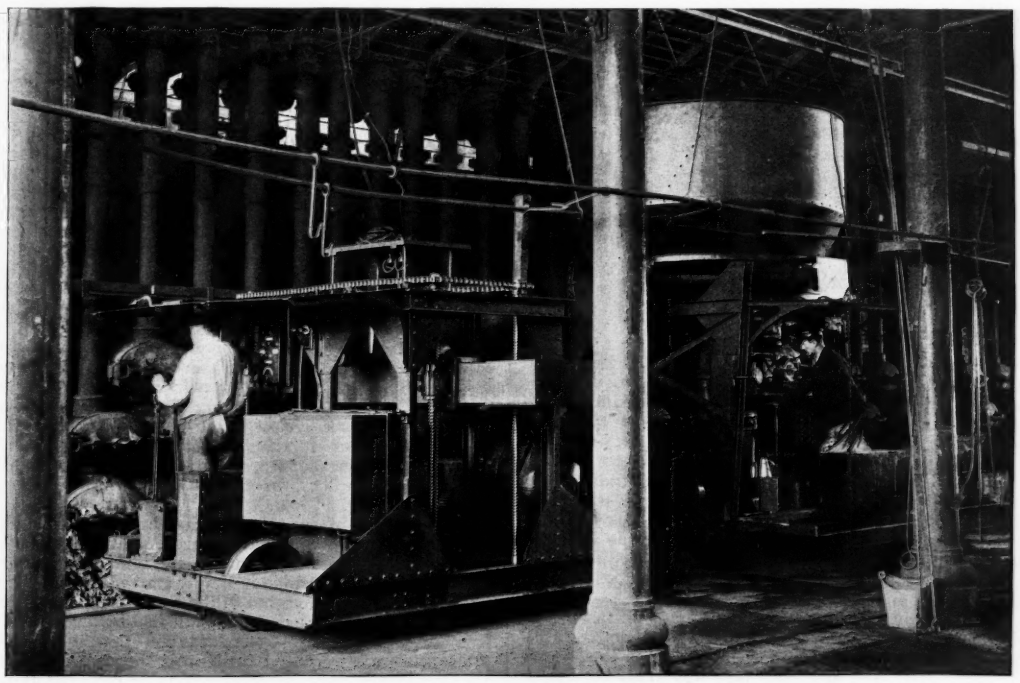


Fig. 1.—Interior of La Villette Retort-House, Showing the Machines in Action.

three of the cases, keenly in favour of inclined retorts. But for the time they (representative no doubt of many others) have cried a halt; and they admit that their convictions have received a check by the doubt engendered as to the issue from the position created by progress, or what to-day appears to be successful and valuable invention. Weaknesses in the latest inventions may disclose themselves with passing time and use; but those who are most capable of judging, do not anticipate this. However, there is the position; and it is no use trying to evade its recognition. The doubt which is shown to exist in these representative instances, it must be confessed, is shared by ourselves from the intimate contact into which, in the discharge of duty, we have been brought with this progress in discovery; and verily, in the undecided position of affairs, it is pleasant that it is not of the functions of the journalist to judge between the merits of one system and another. But, "without fear or favour," what is known must be told; what is seen must be related. Judgment must rest with the practical experience of the future; and there will be, as of old in other matters, whatever may be said here or by partizans of any particular system elsewhere, a "survival of the fittest."

It is in the new methods of charging and discharging horizontal retorts that is found the accentuation of the uncertainty that has existed between the inclined and the horizontal systems. It has been laid to our charge—not publicly but privately—that, in disseminating information recently on the subject of progress in new machinery for working horizontal retorts, the "Journal" is "off with the old love, and on with the new." Here our accuser is mistaken; and the suggestion merely reveals the narrowness of his appreciation of the duties of a journal devoted to the record of technical progress. New work and features, no matter in what line—if it be in carbonization methods, then both inclined and horizontal—must be dealt with in these columns, and that surely cannot be taken as evidence of partizanship or preferential commendation. The new machinery for charging and discharging horizontal retorts which has received special attention in these pages has been, in turn, West's combined machine and the De Brouwer coal-projector; and yet another type falls to be noticed to-day. These machines have all for their aims the increasing of the duty per machine and man, and the diminution of the cost of installation and operation; and in the cases of the new Continental machines, with through retorts, a reduction of both machinery and auxiliary plant—such as coal elevators, conveyors, and hoppers, and the coke removing plant, with the concomitant lessening of the expense for labour and wear and tear.

When describing lately M. de Brouwer's machine, and narrating what was seen of its actual working at Bruges, it was within knowledge that the Engineers of the Paris Gas Company were busily engaged in perfecting a charging-machine (invented by one of the officials), the ruling principle of which was the same—viz., centrifugal force, though the method of applying this force is distinctly different from the one at Bruges. It is indeed curious to contemplate how men's inventive faculties often at given periods run in the same channels, although those men have no possible intercourse with each other, and as often as not belong to different nationalties. Here we have a case in point. However, following

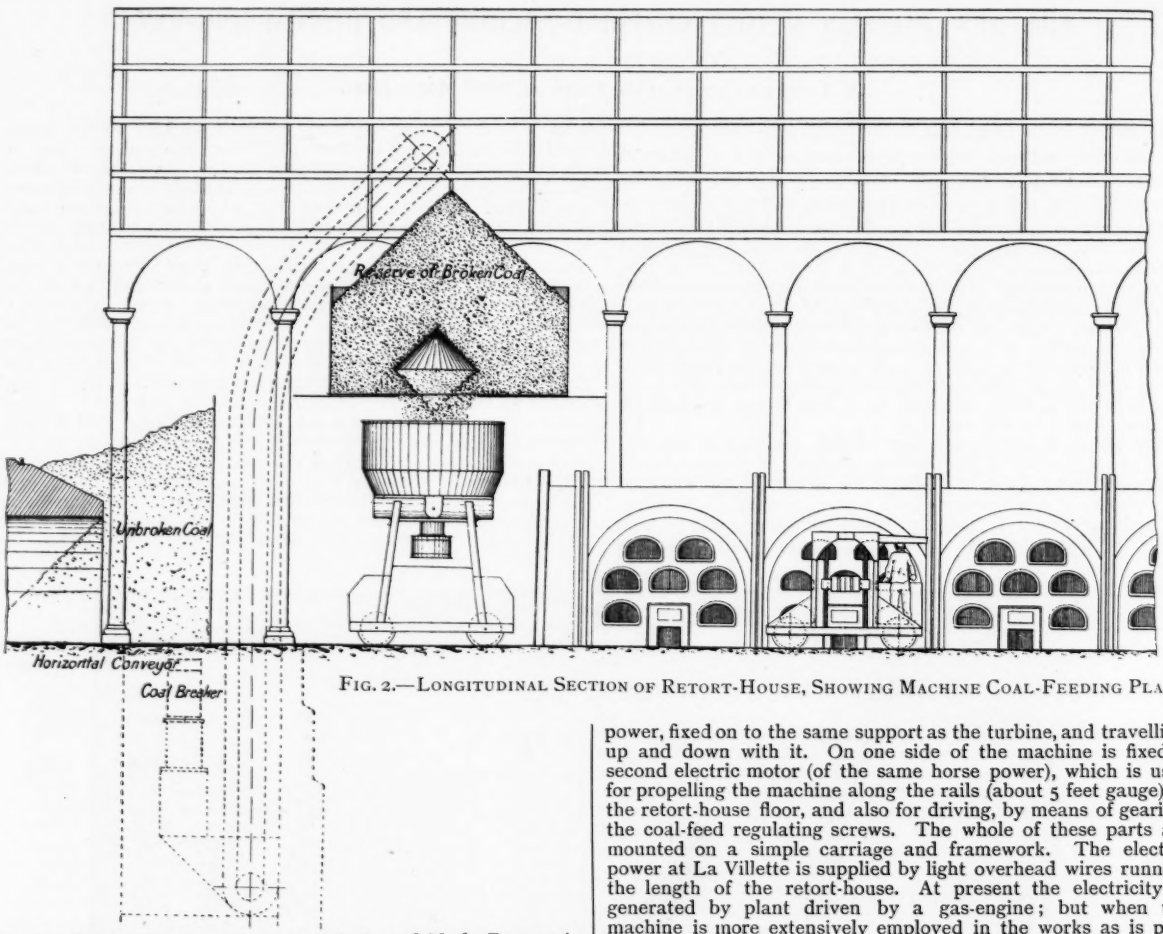


FIG. 2.—LONGITUDINAL SECTION OF RETORT-HOUSE, SHOWING MACHINE COAL-FEEDING PLANT.

on the visit to Bruges and the description of M. de Brouwer's machine, it was our pleasure last week, through the courtesy of M. Bertrand, the General Manager of the Paris Gas Company, to make a special visit to that city to personally investigate the working of the machine and also of a new ram-discharger, which are now both in constant use at the Company's La Villette station. M. Bertrand was cordial in his reception; and our thanks, and those of other gentlemen who were present at the time, are due to him and the several Engineers of the Company for the facilities offered for, and information given while, witnessing the action of the machines. We should like to mention particularly the names of M. Euchène, M. Gigot (the Engineer of La Villette station), and M. Supplisson, the Company's Machinery Inspector.

As will have already been gathered, this machine (as in the case of M. de Brouwer's) projects, and does not convey, the charges into the retorts; and this it can do (also as in the case of the Bruges type) from one end only into any possible length of retort. The machine at La Villette station is charging, with the utmost regularity and precision, from end to end, retorts of about 20 feet long. But to attain to the greatest possible efficiency with these machines, it is a *sine quâ non* that the charging shall not be impeded by the emission of the spent charges on the operating side of the bench; and at La Villette the discharge at the other side is successfully accomplished by the aid of the telescopic ram already referred to. This is mentioned at once, as it will be an advantage in the first place, to give a general description of both machines, and then succeed with the story of the visit.

Taking, then, the charging-machine first. The central or main operating part is a turbine, of a diameter of 2 ft. 4 in., and (in the latest type) containing five blades, each formed of two sheets of steel, riveted together. The turbine is driven by an electrical motor, and from it the charge is projected, by centrifugal force, through a shoot into the retort in a perfectly continuous stream. In the photographs, the shoot will be seen leading from the turbine. The portion of the shoot projecting beyond the framework of the machine is hinged; and when the machine is not in use, it can be turned upwards, so as not to interfere with the compactness of the machine. This portion of the shoot approaches near, but does not enter, the mouthpiece of the retort. Simple means are provided for raising and lowering the turbine and shoot to the retorts at the different levels. At the top of the machine is a coal-hopper of a capacity of about 4 French tons; and the feeding of the turbine from it is accomplished through a telescopic column—the telescoping of the column being, of course, necessary to enable the turbine to ascend or descend as necessary. On the door of the hopper being opened, the passage of the coal into the turbine is regulated by two rotating horizontal screws. The turbine is driven by a special electric motor, of 12-horse power, fixed on to the same support as the turbine, and travelling up and down with it. On one side of the machine is fixed a second electric motor (of the same horse power), which is used for propelling the machine along the rails (about 5 feet gauge) in the retort-house floor, and also for driving, by means of gearing, the coal-feed regulating screws. The whole of these parts are mounted on a simple carriage and framework. The electric power at La Villette is supplied by light overhead wires running the length of the retort-house. At present the electricity is generated by plant driven by a gas-engine; but when the machine is more extensively employed in the works as is proposed, the idea is to use a steam-engine. It is, of course, unnecessary to point out that the pair of 12-horse power motors on the machines are only running during their respective operations, and merely to the extent required. Beyond manipulating the electric switches for placing the machine in position and for starting the turbine into action, the attendant has practically nothing to do, as the process of charging and the speed regulation is entirely automatic.

This question of speed regulation brings us to an interesting point. At the beginning of a charge, the turbine is running at a speed of 430 revolutions, and at the end of the charge at 230 revolutions. The turbine is simply started by moving an electric switch; and the diminution of the speed is gradually (throughout the charge) automatically accomplished by a series of rheostats. It is contended that this is necessary—that, in other words, the projecting force required to deposit the coal at the far end of a 20-feet retort must be greater than is required at the mouthpiece. Hence the regularity of the charge, it is maintained, depends upon this uniform slowing down, by the aid of electrical resistances, of the rate of speed as the coal advances towards the mouthpiece of the retort. It is not intended here to make comparisons between this Paris machine and M. de Brouwer's; but those who have seen the Bruges type of machine charging 20-feet retorts will be disposed to question the validity of this argument, unless, of course, the necessity for the reduction of the speed is inherent to the turbine method of projection. With the De Brouwer machine, after it has once been set for a given size of retort and weight of coal, this automatic introduction of electrical resistances during charging is not found to be necessary; and the level of the charge is all that can be desired. If, in the Paris machine, the series of rheostats can be abandoned, it will relieve it of the only part that appears to introduce a complication into its simplicity, and of the only part which (the impression forces itself upon one) may be the seat of inconvenient mishap. This may be altogether wrong; but it is a point upon which our friends in Paris may perhaps be able to throw some further light. However, there is the additional point advanced in connection with this part of the mechanism that, by its use, the machine can be adjusted to any weight of charge, and to any length of retort. The adjustment is effected by a third switch attached to an indicator. Once the switch is set, it is practically certain (we are told) that the charges will remain within a few pounds of constant weight, until the position of the switch is again changed for a greater or smaller quantity. All the electrical attachments and moving parts are carefully cased in, and thus are protected from dust and grit. Taking the machine as a whole it is a compact and beautiful piece of work; and the inventor, and all who have taken part in its perfection, merit the highest praise. It only occupies a space

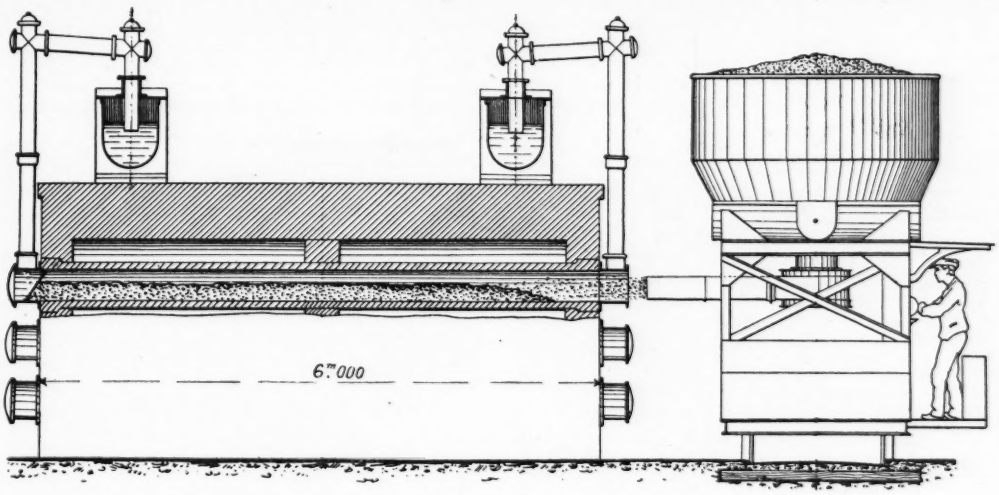


FIG. 3.—SECTION OF THE RETORT, SHOWING THE MACHINE FINISHING A CHARGE.

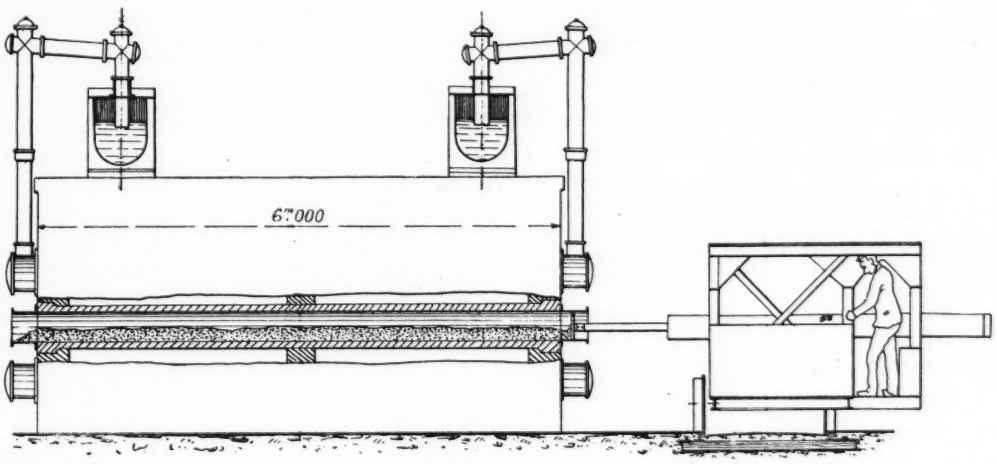


FIG. 4.—SECTION OF THE RETORT WITH THE RAM ABOUT TO WORK.

of 7 feet back to front of the framework, and its total weight, including the hopper, motors, framework, and everything complete, is about 7 tons. The witnessed performances of the machine during the visit will be recounted after a brief description of the electric discharging-ram.

The photograph of the ram fully extended (p. 434) conveys a good idea of its main feature. The ram is telescopic, in three parts; and its head is finished with an adjustable push-plate fashioned to the section of the retort, but of slightly smaller dimensions. On the front of the machine is a toothed-wheel, the teeth being of such extra width as to allow four grooves to be cut, and thus divide the wheel into five sets of teeth, with which the teeth on the underside of the ram engage. The innermost section of the ram engages with the cogs of the third or centre division of the wheel, the second part of the ram with the second and fourth divisions, and the outer part with the first and fifth (or end) divisions of the wheel. The operation of the ram, its raising and lowering, and the propelling of the machine are performed by one 12-horse power electric motor. The machine is fitted with three levers—one to operate it along the floor of the house; the second, to elevate or lower the ram; and the third, to set the ram in operation. When the ram reaches the end of its travel, it returns automatically. The raising and lowering of the ram to any tier of retorts is done very quickly. The arrangement is neat and compact, and takes up very little room in the retort-house. Of course, the object of adopting the telescopic arrangement is the saving of space. The machine does not occupy more than about 7 feet from front to back; whereas, if workable means of telescoping had not been devised, the ram for 20-feet retorts, if in one piece, would have required at least an additional space of 4 metres (or between 13 and 14 feet) for its operation.

Beyond manipulating the levers, the attendant has nothing to do; and he is quite protected from flame and heat. Allusion will be made to the successful working of the ram at La Villette works presently; but among the advantages pointed out as accruing from its use, as compared with other forms of discharging, is that as it is not necessary to leave space in the retort when charged for passing the head of a rake over the charge, the retort may be filled almost to the crown; space only being left to provide egress for the gas and for the intumescence of the charge. This fact alone is of considerable advantage in reducing the retort surface to which the gases are exposed; thus preventing depreciation of illuminating power and formation of naphthalene—not to speak of stopped ascension-pipes. Of course, discharging coke by pushing is not new, as it was tried by Mr. John West some years ago, and quite recently by Herr Schimming at the Charlottenburg (Berlin) Gas-Works; and any failure which may have occurred, it is understood, was not directly due to the effects of the pushing, but to the inequality of the charging. When inequalities occur in the charge, and when a pusher or ram is set to work, the coke undergoes momentary compression. This breaks up the charge at the weak places, with the result that the pieces ride up on each other and eventually jam in the exit mouthpiece. But when the charges are of the evenness of those found at La Villette Gas-Works, there is no fear of trouble on this account; and, indeed, during the months the ram has been in use, there has not been the slightest difficulty from this or any other cause.

These, then, were the two new machines inspected last week under the guidance of M. Bertrand and the Engineers of the Paris Gas Company; and, by the way, it should be mentioned that so pleased are the Company with the experimental working of the machines—the turbine coal-projecting machine and the ram—over the past nine months or so, that it is proposed to adopt them in the whole of the retort-houses at La Villette. A pair of the machines are at the present time only in use in one house; but others are now in course of construction. In the fitted house, the auxiliary plant—such as the coal-feeding and coke-removing arrangements—are at present only tentative; and in the description here given this is a point for readers to remember. The new machines, too, which the Company are constructing will contain all the improvements which the watchfulness of their Engineers has suggested.

A little information may be interpolated here as to the coal, retorts, and charges that were being dealt with by the machines at the time of the visit. The coal which was being used was part Calais and part German. The former possesses somewhat the characteristics of Durham coal; the latter combines certain of the features of both Durham and Yorkshire coal. The yield of this coal at La Villette is about 11,000 cubic feet per ton, or (say) 310 cubic metres per French ton; the illuminating power of the gas ranging between 14 and 15 candles. The retorts (corrugated) in

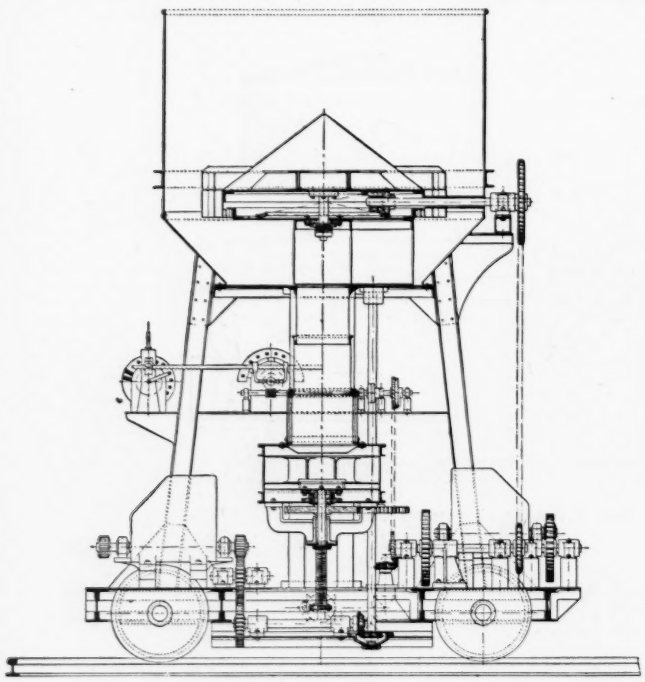


FIG. 5.—CROSS SECTION OF THE CHARGING-MACHINE.

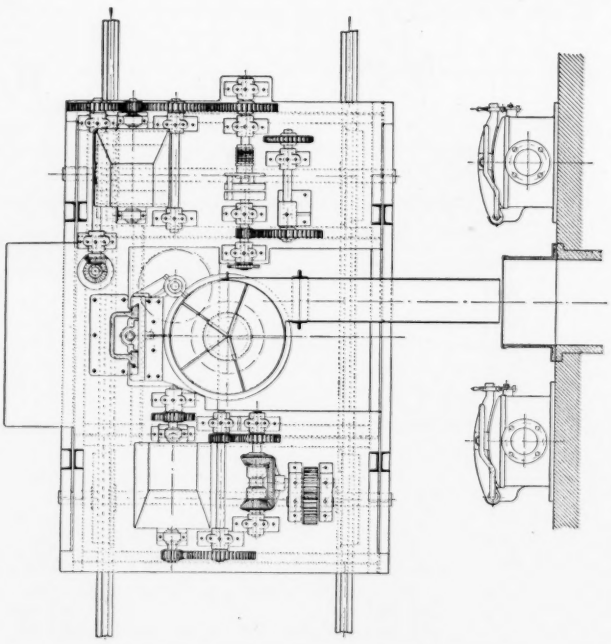


FIG. 6.—PLAN OF THE CHARGING-MACHINE.

the house in which the work was witnessed are set seven in a bed, and are 6 metres through by 64 centimetres by 35 centimetres, and are in section what are usually described as ovaldees—that is to say, dees with a slightly dished bottom. The charges which the machine projects into the retorts are heavy ones—450 kilos, or about 9 cwt. For this sized retort, these are large; and it says something for the splendid heats of the settings that they were found to be thoroughly carbonized. Experiments, we hear, have been made with the machines, which (be it remembered) were specially designed for these heavy charges, to see whether they can be readily adjusted so as to deal with 300-kilo. charges, instead of 450 kilos, with the result that the charges were not then quite so evenly distributed. This, however, is merely a matter of detail that can be dealt with; and we have the authority of an English gas engineer who has examined the machine for saying that he is satisfied that it will be capable of doing the work equally well with the smaller as with the larger charge.

Under the present (part experimental) conditions of working as they were seen last week, the coal is passed through a coal-breaker at one end of the retort-house—the larger pieces being reduced to about 3-inch cubes. The coal is then shovelled into an elevator, simply constructed of a semi-circular trough, and a single chain with drag-plates affixed. This elevator feeds into a reserve hopper, and this supplies the 4-ton hopper at the top of the charging-machine, which is then ready for use. At the time of the visit, it was impossible to see a whole range of retorts charged; but a considerable number were dealt with. Although one of the machines has been experimentally used for the past nine months or so, the one which was seen had only been regularly in work for about three days; and, as a consequence, the men did not handle it with the promptness that will come with a little more practice. However, what can be done is seen by this outstanding fact—that, when the machine is in position, in 30 seconds from the turning of the switch which sets the turbine in motion, the whole length of the 6-metre retort was charged with the 9 cwt. of coal evenly from end to end; and this time was not exceeded in any one of the several instances witnessed. In the yard, by the aid of a second machine and a dummy retort with the top removed, what happens inside the retort was seen. At the farther or discharging end of the retort, a stopper is placed very similar to the ones used in inclined retorts. The coal, on the machine being put in action, comes out of the shoot in a perfectly continuous stream,

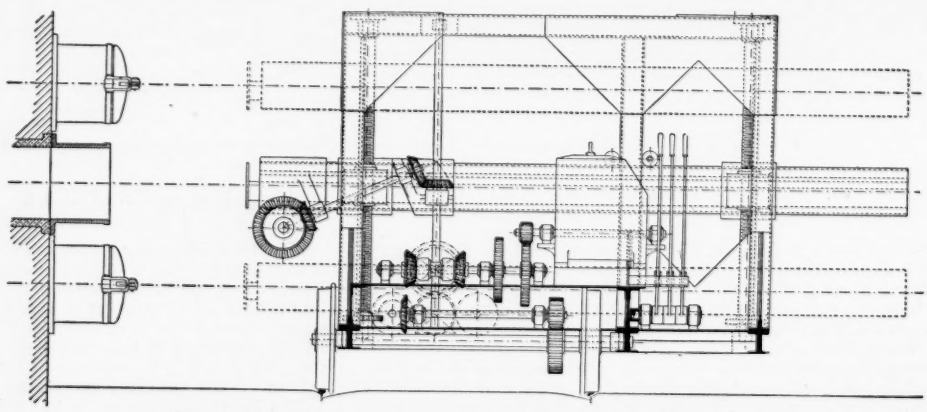


FIG. 7.—CROSS SECTION OF THE RAM DISCHARGING MACHINE.

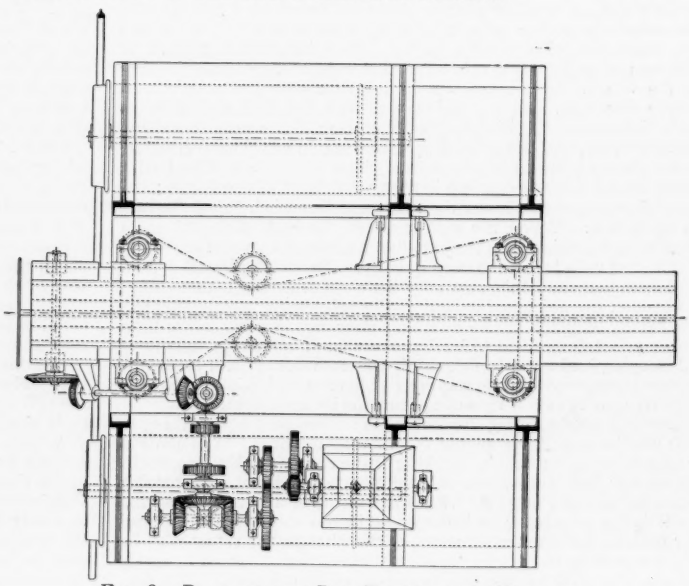


FIG. 8.—PLAN OF THE RAM DISCHARGING MACHINE.

and impacts with the stopper. It banks up there to a certain height; and the section of the bank is maintained precisely to the charging end of the retort. In the dummy retort, there was found no more variation in the surface than is occasioned by the variation of the sizes of the pieces of coal. It was exceedingly interesting to watch the rapid and perfect travel of the charge.

It has been mentioned that the hinged shoot leading from the turbine approaches close to the retort mouthpiece; and herein is found one little matter for criticism. The tremendous rush of air induced by the operation of the turbine, causes the mouth of the retort to be encircled in a thick sheet of flame. This was so in every case; and it most certainly cannot be counted as an

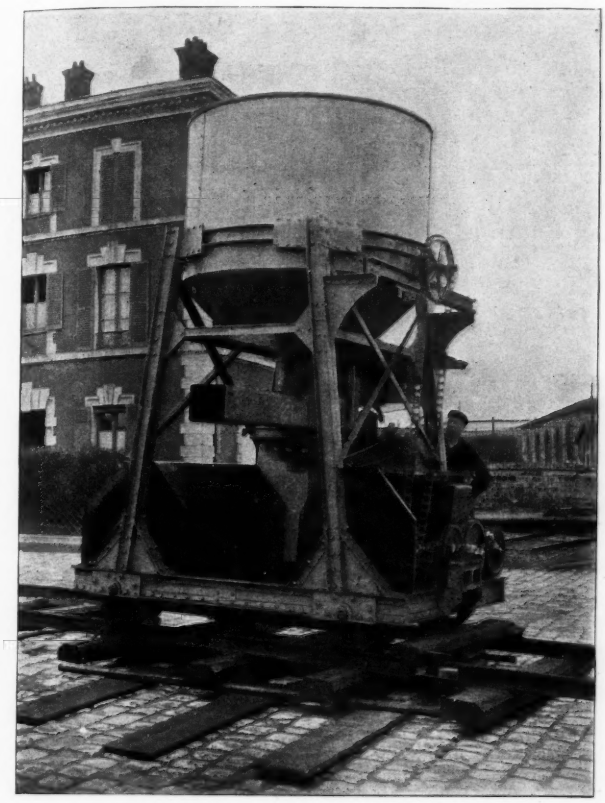


FIG. 9.—ELECTRIC TURBINE CHARGER (FIRST TYPE), FROM LEFT SIDE.

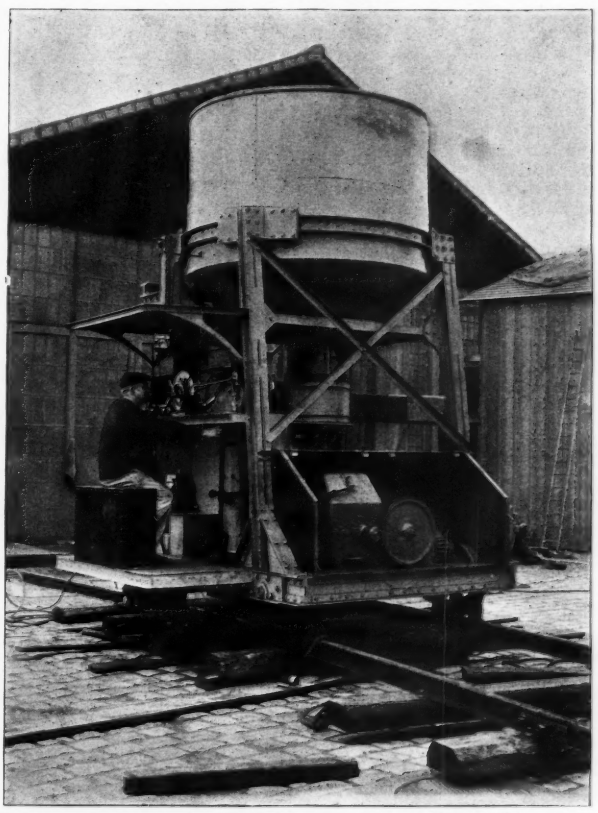


FIG. 10.—ELECTRIC TURBINE CHARGER (FIRST TYPE), SHOWING THE DRIVING MECHANISM, RIGHT SIDE.

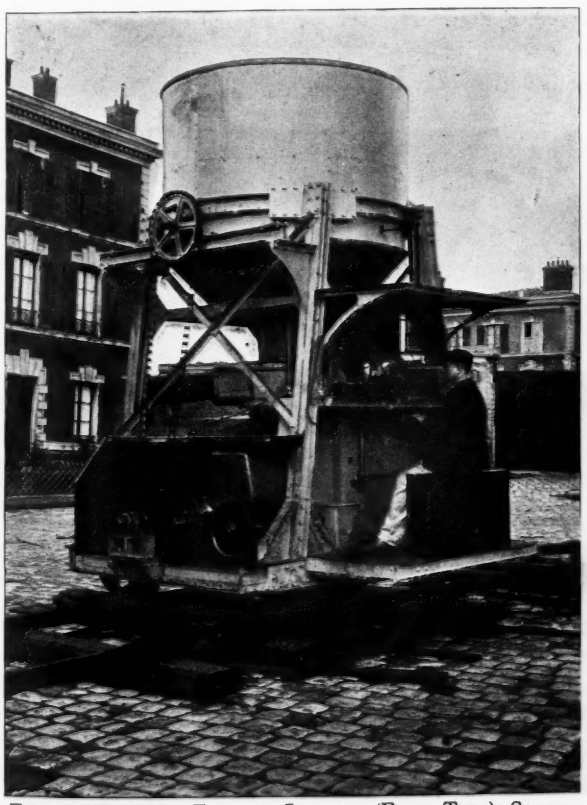


FIG. 11.—ELECTRIC TURBINE CHARGER (FIRST TYPE), SHOWING THE DRIVING MECHANISM, LEFT SIDE.

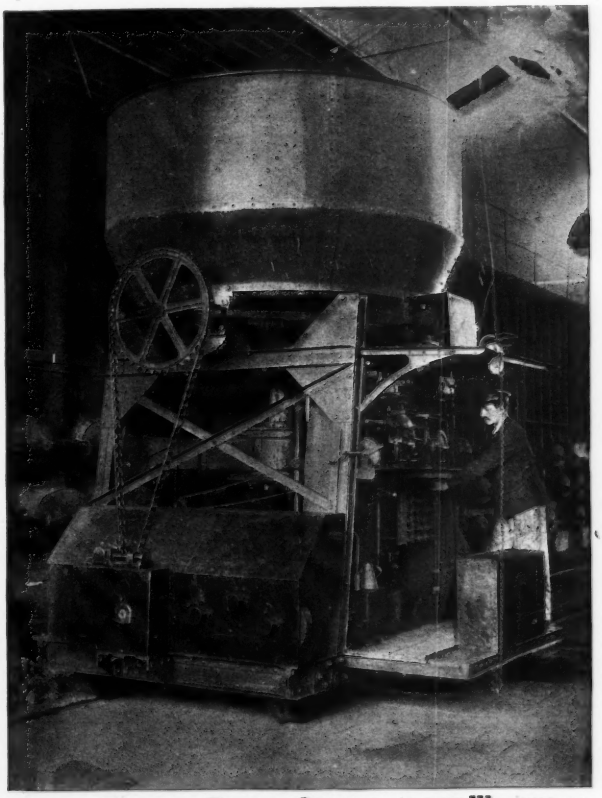


FIG. 12.—ELECTRIC TURBINE CHARGER, AS NOW WORKING IN THE RETORT-HOUSE.

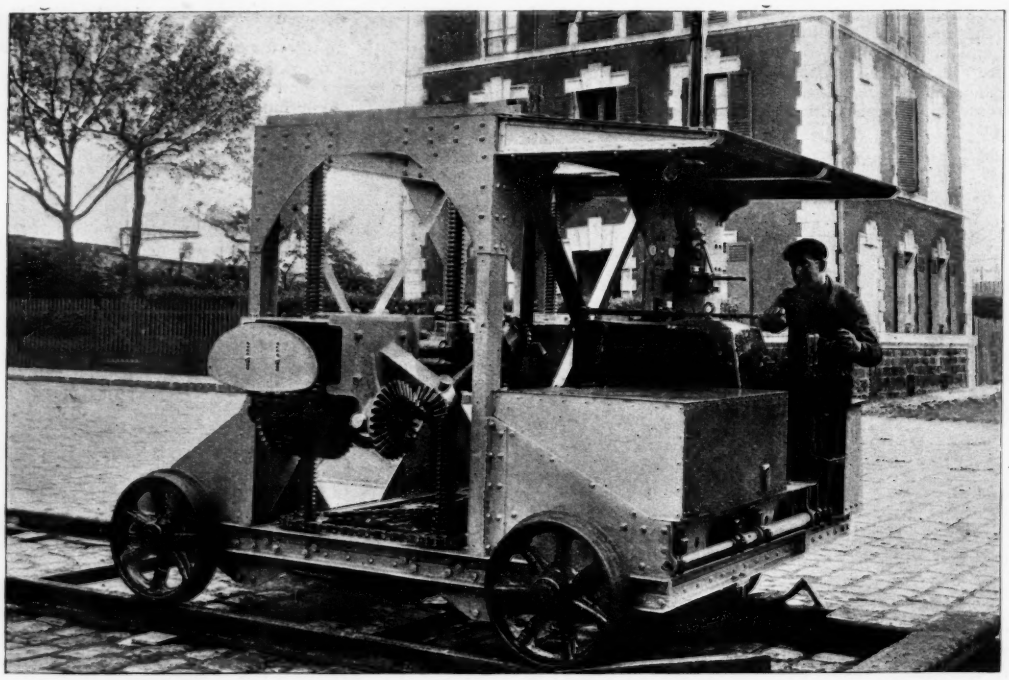


FIG. 13.—ELECTRIC DISCHARGING RAM, SHOWING THE PUSH-PLATE HEAD AND DRIVING MECHANISM.

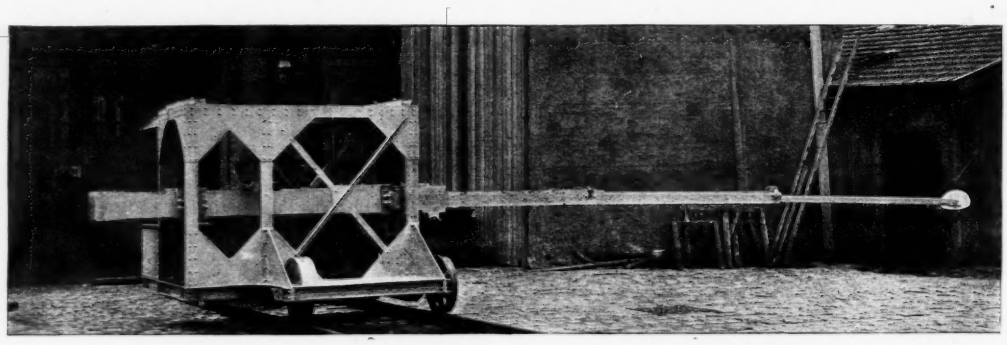


FIG. 14.—THE TELESCOPIC DISCHARGING RAM FULLY EXTENDED.

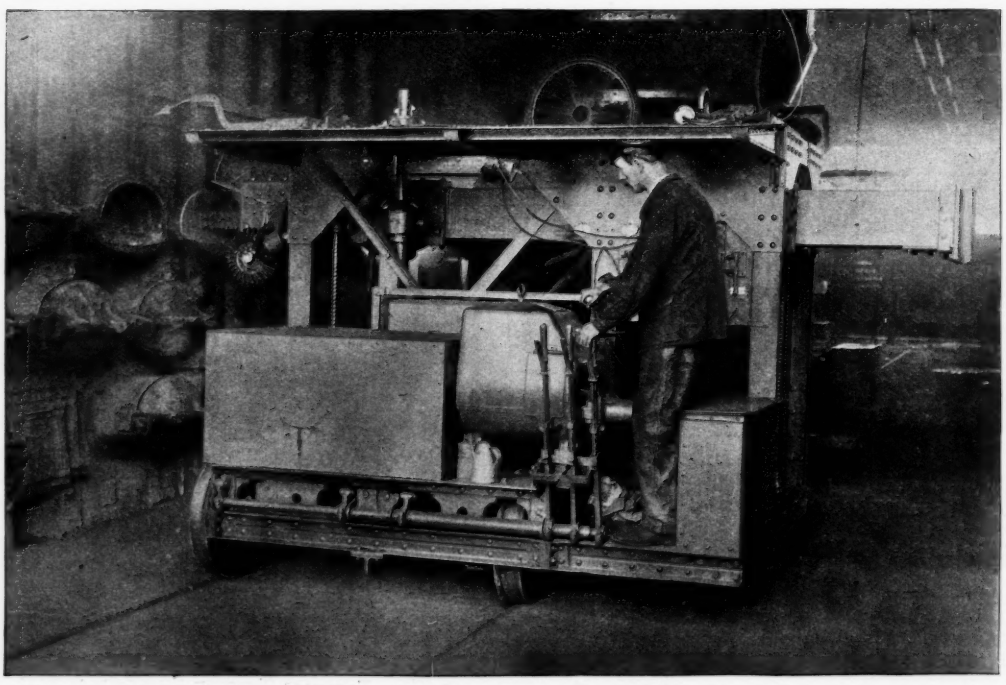


FIG. 15.—THE ELECTRIC RAM (SHOWING THE OPERATING LEVERS) AS NOW WORKING IN THE RETORT-HOUSE.

advantage. But it is not a disadvantage that appears insurmountable. It may be that, if the machine were set farther back from the retort, so that the end of the shoot was not in such close proximity to the retort, this little defect might be cured. Or it may be that a sufficient vent for the air would be found by removing the top portion of the hinged shoot. The way coal will travel by centrifugal force without confinement in a closed shoot to the point at which it leaves the machine, is demonstrated by the De Brouwer type. However, as against this disadvantage (if disadvantage it be), are placed these advantages: That one machine suffices for dealing with 20-feet retorts; that overhead conveyors, hoppers, and measuring-chambers are dispensed with, and only a short length of elevator is needed for feeding the machine-hopper; that it can be readily applied to any retort-house with little, if any, alteration to the existing structure; that there is a great reduction of labour; that installation, interest, wear and tear, and working costs are comparatively light; and that no exception can be taken to the charging.

This brings us to the question of discharging by the telescopic ram; and this, in view of its successful working both during our own inspection and previously during that of certain independent engineers, is of particular interest at the present moment. As has already been said for these quick-operating charging-machines (when on through retorts), it is an almost indispensable condition for good work that the machine side of the bench should be kept free from coke; and only the rapid clearance of the spent charges from the retorts, and their removal from the opposite side of the bench, will (especially with ground-floor houses) permit of the necessary freedom in working. Besides, the discharge on the opposite side of the bench protects the machines from coke dust and the steam from the quenching. Nothing more than has already been stated is required in the way of a description of the ram. It was charming to witness the ease and smoothness of its running and performance. With the movement of the lever, the push-plate at the end of the ram started quietly off, and, in not more than 10 seconds, the whole 20 feet or so of the ram had silently passed through the retort, and had returned home into the machine, having in its outward journey effectively cleared the retorts and only brought back with it on the return not more than a handful or two of stray pieces of coke. The charges, of course, were well burnt off; and the experience as to the clean and rapid discharge (yet without rush or any violent shock to the charge) was repeated in the case of several retorts. Only one outward and return journey was necessary; and not a trace of the spent charge could be afterwards seen in the retort. The whole operation is accomplished so comfortably and quickly that the ram is not overheated, and no cooling water is required. Furthermore, it is pointed out that the ram—not coming into immediate contact with the retorts—cannot inflict any injury on them.

Witnessing the discharge of the coke from the other side of the retort, the large and lengthy mass came tumbling out with perfect regularity; and there was not a sign at any time of likely jamming. The coke is delivered from the retort in large pieces. It was remarked that ample provision must be made to receive the coke charges *en masse* when working in this way. At the present time, trial is being made with a short train of bogies, each consisting of three compartments, which can be tipped separately. The train is drawn on rails by a 4-horse power covered electrical motor. Each bogie is constructed to carry 9 hectolitres of coke; and one spent charge is spread over the three compartments. As the diminutive train passes out of the retort-house, the coke is quenched by an overhead sprinkler, which is in the form of a large piece of grating, constructed of perforated tubes. The train runs over an underground hopper forming the boot of an elevator; and into this hopper the contents of each compartment of a bogie is tipped in succession. The coke is then elevated (a further quenching taking place here), and discharged into waggons for removal to the coke depôt a short distance away.

This completes the descriptive account of our visit last week to La Villette works of the Paris Gas Company to inspect these machines and their operation. It was, as will have been gathered, a visit replete with interest. From what is set forth here as the result of the inspection, readers must make their own comparisons and draw their own conclusions as to the relative simplicity, cost, and efficiency of the machine compared with previously described systems. These are matters best left to the arbitrament of every engineer's judgment and choice. The questions for decision are, Which of the competing machines will do the work best and cheapest, and whether the new types have in any way affected the considerations which have weighed in the adoption in many cases of the inclined retort system of carbonization. The present position, to say the least, is an exceedingly interesting, if not a difficult one.

[We must, in conclusion, acknowledge our indebtedness to M. Bertrand for the splendid series of photographs from which the pictorial illustrations have been prepared.]

Mr. Charles Carpenter, who (with Mr. James W. Helps) also inspected the machine at La Villette works last week, writes:—

The idea of blowing coal into a retort is not new. As far as my memory serves me, it originated with Ross, whose machines worked for some considerable time at Nine Elms, and, I think, at one other Provincial works; but two machines were required to charge a 20-feet retort.

The sweeping advantage which the new type gives is that you wipe away at once one-half of the men required in charging a 20-feet retort in the ordinary way by machinery. This advantage renders such an apparatus far and away superior to anything which has preceded it. Secondly, with regard to discharging, the same thing happens—one-half the men at least are dispensed with. I am not sure that it would not be found possible in large retort-houses to dispense with three-fourths of the men employed on the rakes, since, as a rule, the charger has to "wait upon" them; but with the new conditions, it might even be possible to work either two charges per ram, or a charger operating two retorts simultaneously.

There is another great advantage of the ram method which might be mentioned, and this is the great reduction in the amount of breeze produced compared with machine-worked rakes. This is a well-known advantage of the inclined retort, and undoubtedly means an increased output of coke.

The necessity for working the two machines on one side happens at La Villette because the houses are floor-houses, with no coke vault for the disposal of coke. With this latter provision, retorts could be charged at will on either or both sides; but even in the case of a new installation, I think the arrangement at La Villette would be preferable.

It is well known by those who use stoking-machines that it is the coke dust, rising in the form of "fliers," which does the greatest harm to the working parts of the machinery. Coal dust is comparatively unharmful, as it is to some extent self-lubricating. I can conceive, therefore, wear and tear of the machines reduced to a minimum by the arrangements at La Villette, since the coke is quenched and the "fliers" rise on the opposite side of the retorts to that at which the machinery is placed.

I have an idea that to some extent the ease with which the discharging operations are carried out depends upon the section of retort—that used at La Villette being very suitable. But even if this is so, the obvious gain is so great that one can readily afford to reject one's present sections of mouthpieces and retorts.

If all is accomplished by the new machinery that it promises, I should say a carbonizing plant to which it has been adapted would possess all the advantages of inclined retorts at their very best, without the disadvantages which arise in their continued working, or with variation in the physical constitution of the coal to be handled.

As regards the rush of flame from the charging-mouthpiece, I attach little importance to that. I have seen worse with ordinary machine stoking, and bear in mind that the flame that comes out is an equivalent of the two mouthpieces used in ordinary working.

In the early part of the foregoing article, reference was made to a communication received from Mr. F. D. Marshall on the subject of these machines. Mr. Marshall is so convinced of their superiority that he has secured from the Paris Gas Company the British and Colonial rights in the invention; and it is understood that the Whessoe Company will be the makers of the machines in this country. As a point of interest, it may be stated that Mr. Marshall is about to discard his original idea of putting up inclined retorts at the new Flensburg works of the Danish Gas Company, and will recommend the Directors to have horizontal retorts, with the turbine machine and discharging ram. However, in the course of his communication, he writes:—

The question will naturally be asked, What is the cost of carbonizing by the machine, and what would be the approximate amount of wear and tear? The writer adduces the following figures based on the experiences in Paris; and it must be confessed that the result is an astonishingly low one:—

Cost of Carbonizing per 1000 Cubic Feet with the Turbine Machine.

Allowing for shifting machines, one retort 20 feet long can be charged and discharged in two minutes with the turbine machine.

One retort discharged and charged in two minutes equal 30 retorts per hour, or 720 retorts per diem, set as either sixes, nines, or tens.

If each retort is discharged and charged every sixth hour, the number of retorts one set of machines can work will be: $30 \times 6 = 180$ retorts in six hours; $180 \times 4 = 720$ retorts per diem.

At 1300 lbs. per retort, 720 retorts will in 24 hours carbonize 418 tons of coal. 418 tons = 4,180,000 cubic feet of gas per 24 hours.

To produce this quantity of gas, one charging and one discharging machine will require per 24 hours (twelve-hour shifts)—

Four machinists	at 7s.	..	28s.
Two relief men	at 7s.	..	14
Two men for opening and closing mouthpieces	at 5s.	..	10
Four men for attending generators (20 ovens of nines)	at 5s.	..	20
Two men for attending coke-conveyors*	at 5s.	..	10
Two men for attending electrical dynamos and gas-engine†	at 5s.	..	10
			92s.

* This would include the actual stacking of the coke in the yard by the conveyor.

† If the electrical generating plant be placed near the exhauster-room, this could be well attended to by the exhauster attendant on day and night duty, and an outlay of 10s. per diem saved.

Every 1000 cubic feet of gas will therefore cost—

$\frac{92 \times 12}{4180} = 0{\cdot}26$d. per 1000 cubic feet.

Wages per 1000 cubic feet	0·26d.
Gas for engine, including oil, waste, per diem 25s.— $\frac{25 \times 12}{4180} = \frac{300}{4180}$	0·07
Wear and tear and interest on installation capital (£3000) 15 per cent. per annum £450 * $\frac{450 \times 20 \times 12}{4110 \times 365} = \frac{108{,}000}{1{,}525{,}700}$	0·07
Total cost of carbonizing per 1000 cubic feet . . .	0·40d.

Exception may be taken to the figure—15 per cent. per annum—for interest and wear and tear as being insufficient. The cost of carbonizing per 1000 cubic feet is, however, so low that the capital expenses can well bear another 10 per cent. without affecting the results to any appreciable extent. It must likewise be noted that the costs of the attendants on the coke-conveyor practically include stacking coke in the yard. Without a good coke-conveyor, it would be inconvenient to work the pusher, as the volume of hot coke discharged from each retort in 15 seconds is very considerable, and would cause hardship to the men if called upon to handle this mass manually.

The second question will naturally be, How does the capital cost for installation compare, for instance, with an installation of inclined retorts? The writer is in a position to put forward the following fairly accurate figures, based on tenders actually received for retort-houses (new) and installations of inclined retorts or retorts worked by the turbine machine.

Retort-House and Installation of Retorts Equal to a Production of 900,000 Cubic Feet per Diem.

Inclined System.		*Turbine System.*	
Ovens	£11,787	Ovens	£7,740
Chargers	275	Flooring.	1,313
Flooring	1,403	Charging and drawing machines, dynamos, &c..	3,175
Gangways . . .	100	Hopper, coal breaker, and elevator . . .	1,284
Hoppers	824	Retort-house . . .	2,031
Staircases* . . .	120	Foundations . . .	150
Coal breaker and elevator	1,675		
Retort-house . . .	3,151		
Foundations . . .	150		
	£19,485		£15,693
Saving	£3792.		

In the building alone, owing principally to the reduction in height, a saving of about £1000 is effected.

The writer has under contemplation for his new Flensburg works the idea of coupling up the charging and pushing machines so that one attendant can easily operate both. This, in small and medium works, presents considerable economy in working, and the costs of the machines are likewise reduced, as only two electro-motors would be required.

The advantages presented by the turbine machine are, in the writer's opinion, very considerable and worthy of serious attention, and may be briefly stated as follows: (1) Very great economy in labour. (2) Moderate prime cost. (3) Adaptability to almost any retort-house and form of retort. (4) Minimum of wear and tear. (5) Enormous working capacity, as one machine performs the work of two ordinary mechanical stokers. (6) Certainty in action.

* A year's working at the Paris Gas-Works has shown the wear and tear to be considerably under this figure.

THE LAW AND PRACTICE RELATING TO TEST GAS-BURNERS.

RECENT events occurring in connection with parliamentary proceedings in relation to the Metropolitan and Suburban gas supply, have brought into great prominence the questions of the standard burner which should be used in statutory gas photometry, and of the manner in which it should be used to obtain a fair indication of the illuminating power of gas. It is probably well known to regular readers of the "JOURNAL" how these questions (which are always lying across the gas manufacturer's path) became urgent this year, for at least two of the London Gas Companies and one large Suburban Company. Not to repeat this mass of the current literature of the subject, which bulks large enough in our parliamentary reports for the present session, it will perhaps be useful at the present juncture to state precisely how the case of the standard test-burner stands, both in law and by usage.

Plainly, the testing of illuminating gas must be based upon the performance of the gas in a standardized burner, used in a particular and unvarying way. Although it was not the first of its kind, it is unnecessary for practical purposes to go back further than the description of the proper and suitable burner for testing purposes occurring in the City of London Gas Act, 1868, which declared that the burner should be "the most suitable for obtaining from the gas the greatest amount of light, and be practicable for use by the consumer." There was such a burner in existence; and the London Gas Referees, who were charged by the same Act with this duty, selected it. By 1876, Sugg's "London" argand burner, No. 1, had accordingly been prescribed and used by the Referees in pursuance of the Act of 1868 for testing common gas; and it was, and remains, the only standard gas-testing burner sealed, stamped, and deposited at the Standards Department of the Board of Trade. If, therefore, any Act of Parliament or other document makes mention of the standard test-burner, this is the one, and the only one, that answers to the description. Copies of it are sealed by the Referees for use in testing London gas; and its dimensions are recorded in the illustrated description of the burner appended to the Referees' official notifications.

It has a 24-hole argand steatite top, with a two-current air supply—one current occupying the whole central area of the annular steatite chamber, and the other surrounding the chamber outside, being deflected to impinge upon the flame by means of a metallic frustum of a cone. The body of this burner has the peculiarity of a solid "gallery," to take the chimney, which is adapted to accommodate two sizes of chimneys. The outer channel will take a chimney $1\frac{7}{8}$ inches in internal diameter, and the inner channel will take a chimney $1\frac{5}{8}$ inches internal diameter. Hereby hangs a piece of history. Originally, the argand burner in question was made for testing 14-candle gas, and was only fitted with the smaller chimney, $1\frac{5}{8}$ inches diameter. It was never stamped as such. When the attempt was first made to use it as the test-burner for the gas supplied to the City of London in 1868, it was discovered that this gas could not be burnt in it, as then fitted, at the 5 cubic feet rate of consumption. Therefore, Mr. Sugg was ordered to make a larger gallery, to take a bigger chimney. This was effected, without doing away with the original smaller gallery; and thus the burner was adapted to burn gas of two different qualities, at the same rate, by changing chimneys.

The legal point to be noted here is, however, that only the larger chimney, the full sized one to fit the outer gallery, $1\frac{7}{8}$ inches diameter inside, is deposited with the Standards Department. This, therefore, is the only standard test-burner known, without special prescription; and, as will be seen, it is only adapted to properly burn the richest gas for which it is made—that is to say, 16-candle common coal gas. Sometimes the dimensions of the chimney are stated in terms of outside measurement, when a $1\frac{7}{8}$ inches chimney would be called a 2-inch chimney, or a $1\frac{5}{8}$-inch chimney or $1\frac{3}{4}$-inch chimney. But we follow here the inside measurements, in order not to unnecessarily confuse a sufficiently intricate matter. It will now be clear that the Sugg's "London" argand No. 1 burner is standardized only in one pattern, which is that proper for testing 16-candle gas. Strictly speaking, there is no standard burner for 14-candle gas, or any other quality of gas except 16-candle, which is alone capable of being burnt to the best advantage by the deposited burner, with the deposited chimney. It then yields a flame of 16-candle power, for a gas consumption of 5 cubic feet per hour. This is standard. There is not the slightest doubt of what 16-candle gas is, by this standard.

When, however, the smallest deviation occurs in the quality of the gas to be tested in this way, the simplicity of the equation disappears. Inasmuch as it is precisely this sort of deviation which it is of practical importance to measure, the question that arises is, how to do it with the greatest attainable fairness, which means, with the closest approximation to the truth. We manifestly do not want the determination of the variable quantities of illuminating power of the gas to be complicated by any question of instrumental variation. In other words, the standard of measurement must remain invariable, if varying quantities of stuff are to be justly measured by it. The standard, as we have seen, comprehends one fixed point—the actual burner which, by prescription of the Metropolitan Gas Referees, must have a 6 in. by $1\frac{7}{8}$ in. chimney when used for burning 16-candle gas, and a 6 in. by $1\frac{5}{8}$ in. chimney when used for 14-candle gas. At first, and for many years after the selection of this standard burner, it was required to be supplied with the gas to be tested, at the constant rate of 5 cubic feet per hour. Up to the coming into force of the revised instructions issued by the Referees in May, 1898, this was the rule; and the determination of the illuminating power of the gas was made by the aid of some form of Bunsen photometer, of which there were several certified by the Referees. At this time, however, the Referees changed the system entirely—substituting for the old form of photometer the "table photometer" devised by themselves, an essential feature of which was that the gas to be tested had to be burnt at the constant illuminating effect of 16 candles in the test-burner. The variable quantity, the measurement of which gave what is called the illuminating power of the gas, was consequently changed from the amount of light given by 5 cubic feet of hourly consumption by the standard burner, to the quantity of gas required to be burnt in hourly consumption by the same burner to yield the fixed light of 16 candles. This prescription recognized that the standard burner is properly used when, and only when, its light is exactly equal to 16 candles. It is pertinent to observe that this direction is precisely in accordance with the spirit of the Act of 1868, inasmuch as it is the same treatment of the burner and its flame as the ordinary consumer would apply to it for the purpose of lighting—that is to say, he would "turn up" the gas if necessary to get the full flame to which he was accustomed; and, on the other hand, he would check it if it tailed over the top of the chimney. With a pure coal gas—or gas benzolized up to satisfy the requirement of 16 candle power—this procedure is in the true sense of the much-abused term, scientific.

But, unfortunately, the Metropolitan Gas Referees and the gas

examination staff of the London County Council would not rest here. While presumably satisfied that the proper way to use the London argand burner No. 1 with reputed 16-candle gas—which might, in fact, be expected to range between 15 and 17 candles—is to burn the gas at the constant 16-candle flame rate and compute the illuminating power from the rate of consumption required to produce this effect, they objected to the South Metropolitan Company's 14-candle gas being tested on the same principle, and ordered the Commercial Company's 14-candle gas to be burnt in the same burner at a 14-candle flame rate. The London County Council therefore promoted legislation this session to repeal the South Metropolitan Company's statutory right to have their gas tested at the 16-candle flame rate; and the Referees altered their table photometer in order to suit the prescription of a 14-candle flame test. To this the Commercial Company objected, and sought the assistance of Parliament in the matter. The immediate result has been that the Board of Trade have consented to have the whole subject inquired into by a Departmental Committee; and meanwhile the alteration proposed by the Referees with respect to the testing of Commercial gas will not be allowed. Consequently, until fresh legislation shall dispose differently, the whole of the gas supply of London will henceforward be tested for illuminating power by means of the "London" argand burner, No. 1, with gas burnt so as to produce a light equal to that of 16 candles; and the statutory illuminating power will be computed from the quantity of such gas required to be consumed per hour by the standard burner so as to give this luminous effect, with the size of chimney appropriate to the declared quality of gas in every case.

This discussion naturally raises the question of what is the proper and fair definition of the candle power of gas with reference to the test-burner. Some contend that, as there is a standard burner, which is conceded to answer the conditions laid down by the Act of 1868, the common-sense definition is, that the illuminating power of any sample of gas suitable for burning in this burner, within the meaning of the Acts, is a number which can be computed from the rate of consumption of such gas by the said burner when used as the consumer would use it—that is, with a full flame. Sixteen candle light is the best the burner can afford, in the ordinary way, without smoking, which, of course, the consumer would not permit. Less than this amount of light, as indicated by a partially turned-down flame, the consumer would not endure. He does not know the rate at which the gas is burning, but turns up the flame until he is satisfied. If it is 16-candle gas with which the flame is being supplied, then the consumption will be at the rate of exactly 5 cubic feet per hour. If it is 14-candle gas the consumption will be, by the rule-of-three, at the rate of 5·7 cubic feet nearly, assuming that the conditions are equal. Really, they cannot be equal for different qualities of gas, which require corresponding quantities of air for their combustion with the greatest flame luminosity; but the smaller chimney, having a diminished air-way, effects a rough-and-ready correction of the standard burner for gas down to (say) 12-candle power. Assuming, therefore, the validity of the rule-of-three calculation in this connection, it follows that, with a change of chimneys, the standard burner—Sugg's "London" argand No. 1—always burning at the 16-candle flame rate, can be accepted as a fair common measurer for what is called the illuminating power of gases between 17 and 12 candle power inclusive. It is an intelligible measure. By using this means, one can readily understand what is meant by 17, 16, 14, or 13 candle gas, which are qualities of gas that actually have legal existence. They are definable as gas which must be burnt at a particular rate per hour in the standard burner to produce a light of 16 candles. It is firm ground, so far as it goes.

It is not, however, strictly after the spirit of the Act of 1868, more particularly as expressed by the clause of the West Ham Act, 1902, which lays it down that in making a test the gas shall be burnt at such a rate as to yield the maximum light for which the burner is designed. It cannot be disputed that the true intent of the Legislature in framing these enactments was that the gas should have the full advantage of being tested by the best burner available for the purpose, provided that it was a consumers' burner and not some laboratory speciality. Now, although the standard burner is a good burner, it would be rating it too highly to class it as the very best make of argand burner possible to be made for even 16 or 14 candle gas—to say nothing of other qualities of gas. The distribution of the air currents leaves something to be desired. By the simple addition of a central pin, the flame can be rendered much steadier. Also, by making this pin larger or smaller, the quantity of air supplied to the inside part of the flame can be adjusted to its requirements. By admitting a third current of air between the deflector and the chimney, the glass can be kept cooler, cleaner, and the upper part of the flame more effectively aerated. The shape of the deflector itself is susceptible of improvement. Finally, common-sense approves of the dictum of Sir John Brunner, the Chairman of the House of Commons Committee on the Crystal Palace District Gas Bill of this session, that "Parliament is waking up to the idea that, instead of making rigid rules with regard to apparatus and with regard to other matters, it would be well to insist upon everybody using the best available practical means from time to time." In the light of such an observation, it would be to saddle the gas industry of the United Kingdom with an unnecessary disability if, for the sake of an appearance of uniformity which has no practical value, the legal quality of every make of gas were to be rigidly defined with reference to its performance in an imperfect burner.

The conclusion to which one is led is, therefore, that gas manufacturers claiming to be selling gas of any prescribed illuminating power are entitled to have this quality determined for legal purposes by the most suitable burner, used in the manner most favourable to the gas. The argand type of burner is the best for the purpose. It is actually in the market, in a complete range of sizes suitable for burning every quality of illuminating gas likely to be met with in business. The consumer can please himself which pattern he will buy for use with the gas supplied to him; and the gas manufacturer has an equal right of choice. In using the selected burner for testing gas, the method adopted by the Metropolitan Gas Referees, of a constant flame rate, is quite satisfactory. The amount of light settled upon will evidently depend upon the size of the burner. It need not necessarily be a 16-candle flame, unless for the "London" argand burner, No. 1, which is actually the "D" burner in Sugg's consumers' series of argands. The series runs from "B" to "K," every size differing by two holes in the steatite top from the next above or below it. The holes are all of the same size. A "C" argand burner, with 22 holes, might be found to answer best for 13-candle gas; and so on for other qualities.

The obvious question in this regard is, How to determine on the burner to be used? It would be necessary to guess the probable quality of the gas before trying a test-burner; and if the guess were erroneous, the selection would be a mistake. All uncertainty on this score can be avoided by simply having recourse to that useful invention, Sugg's illuminating power meter, which is a true friend and valuable assistant to the gas manufacturer. It is too well known an instrument to require describing at length; but a word or two on the argand burner used with it will not be superfluous, after what has gone before. This is an argand specially made for the purpose of burning any quality of gas, from 54 candles to 12 candles, at a uniform 3-inch flame rate. It is a 24-hole burner, with the hole-circle $\frac{1}{20}$-inch larger in diameter than the standard "London" argand; and it burns 16-candle gas at the rate of 5 cubic feet per hour, with a flame exactly 3 inches high in a 7 in. by 1§ in. chimney. This is the datum. Keeping the height of the flame constant, the gas consumption necessary to produce it with different qualities of gas varies, and the equivalent candle power is read off upon the meter dial. Preferably, the fixed datum should be a 16-candle flame, instead of a 3-inch flame. With 16-candle gas, it will be the same thing; and the relation will not be seriously disturbed for a considerable distance up or down the scale of quality. At the extreme reading, however, there is a difference between the height of the flame and its candle power; and this is particularly the case when a carburetted water gas mixture is being burnt. Mr. Sugg is aware of this, and wishes accordingly to abandon the datum of flame-height for that of flame-light. When the approximate illuminating power of a sample gas has been ascertained by this means, the suitable argand burner can be selected for use in testing it in the ordinary photometer.

It follows from all this, that the requirement to test gas by burning it at the constant 5 cubic feet rate, contained in Schedule A of the Gas-Works Clauses Act, 1871, is obsolete, and should be abandoned. No opposition is being encountered by those gas companies who follow the precedent of the West Ham clause for its amendment. Mention should be made here, in order to complete the record, of the patterns of test-burners used by various gas companies under the terms of their Special Acts. This has usually come to pass by reason of these companies being under the obligation to test by the "15-hole argand." The practical problem of making a 15-hole argand burn gas decently at the rate of 5 cubic feet per hour has been solved in several cases, including that of the Wandsworth and Putney Company, by constructing the hole-circle of the same diameter as that of the "London" argand, and making the holes of an elongated form. There is nothing, we are assured by Mr. Sugg, in this alteration of the shape of the holes in the burner tip. There is far more in the adjustment of the air supply rendered feasible by the "tri-current" arrangement already described. Preston, at the other end of the scale, uses an 18-candle argand. It will strike any unbiassed person that, inasmuch as no burner can add anything to the quality of the gas burnt in it, while it can easily fail to utilize it, the gas manufacturer has in fairness a right to have his product tested by the best burner any consumer could obtain for the purpose, and use it in the best way. To pretend that the public interest is served by treating gas differently is sheer pedantry, or what the French call "*Chinesery*." This is the whole secret of test-burners; and when looked into, it is no secret at all. Nevertheless, the difference in result between testing the same gas fairly and unfairly, in respect of the burner alone, may be as much as 30 per cent. of the more favourable figure.

The list of candidates for the position of Clerk to the Metropolitan Water Board includes the names of Mr. G. W. Clarke, the Town Clerk of Stepney; Mr. W. Terry, the General Manager of the Water Department of the Sheffield Corporation; Mr. C. J. Stewart, formerly Clerk to the London County Council; and Mr. Harry Wilkins, Secretary of the Lambeth Water Company.

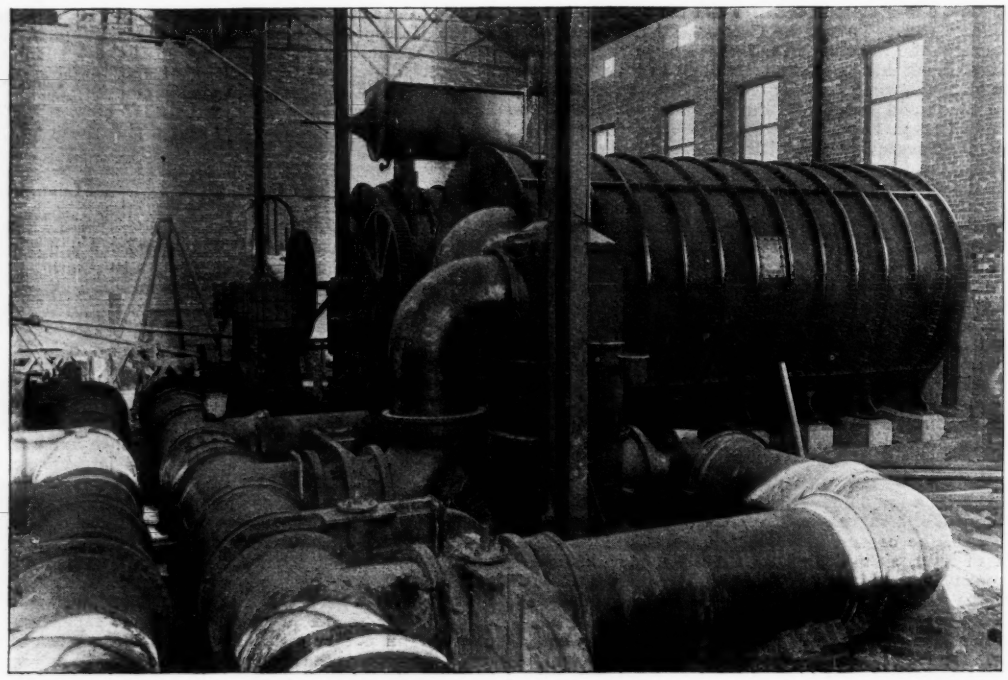
THE GRANTON WORKS OF THE EDINBURGH AND LEITH GAS COMMISSIONERS.

DESCRIPTION PREPARED

BY

WALTER RALPH HERRING, M.INST.C.E., *Engineer.* *

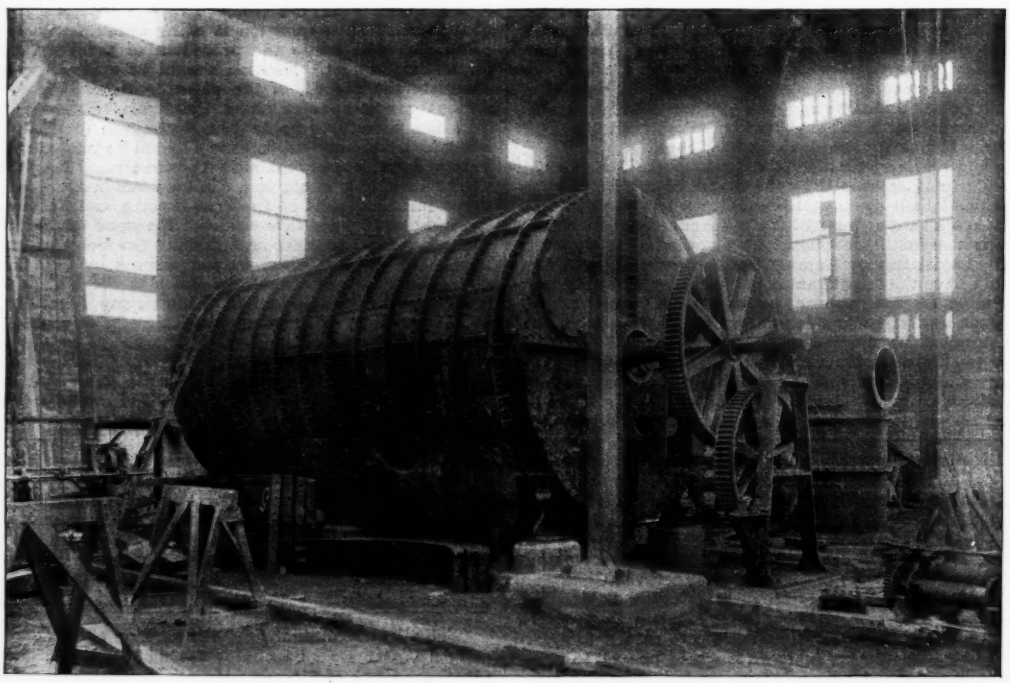
ARTICLE XIX.—Accompanied by Plate No. 20, illustrating the Plant and Machinery in connection with the Tar Extracting, the Ammonia and Cyanide Washing Machines, and the Plant for the Manufacture of Cyanogen Compounds.



PHOTOGRAPH No. 98.—The inlet, outlet, and bye-pass connections in the plant-house.

THE gas, after leaving the exhauster-house, passes underground for the first time for a distance of about 170 feet, where three valves and connections are laid (opposite the south end of the plant-house) in such a manner as to permit of the reuniting of the two streams of gas into one, or the diversion of either stream to either section of the subsequent plant.

The plant-house is shown on Plate 20, and contains the Pelouze and Audouin condensers, the washer-scrubbers for the ammonia



PHOTOGRAPH No. 99.—The "Holmes" scrubber-washer.

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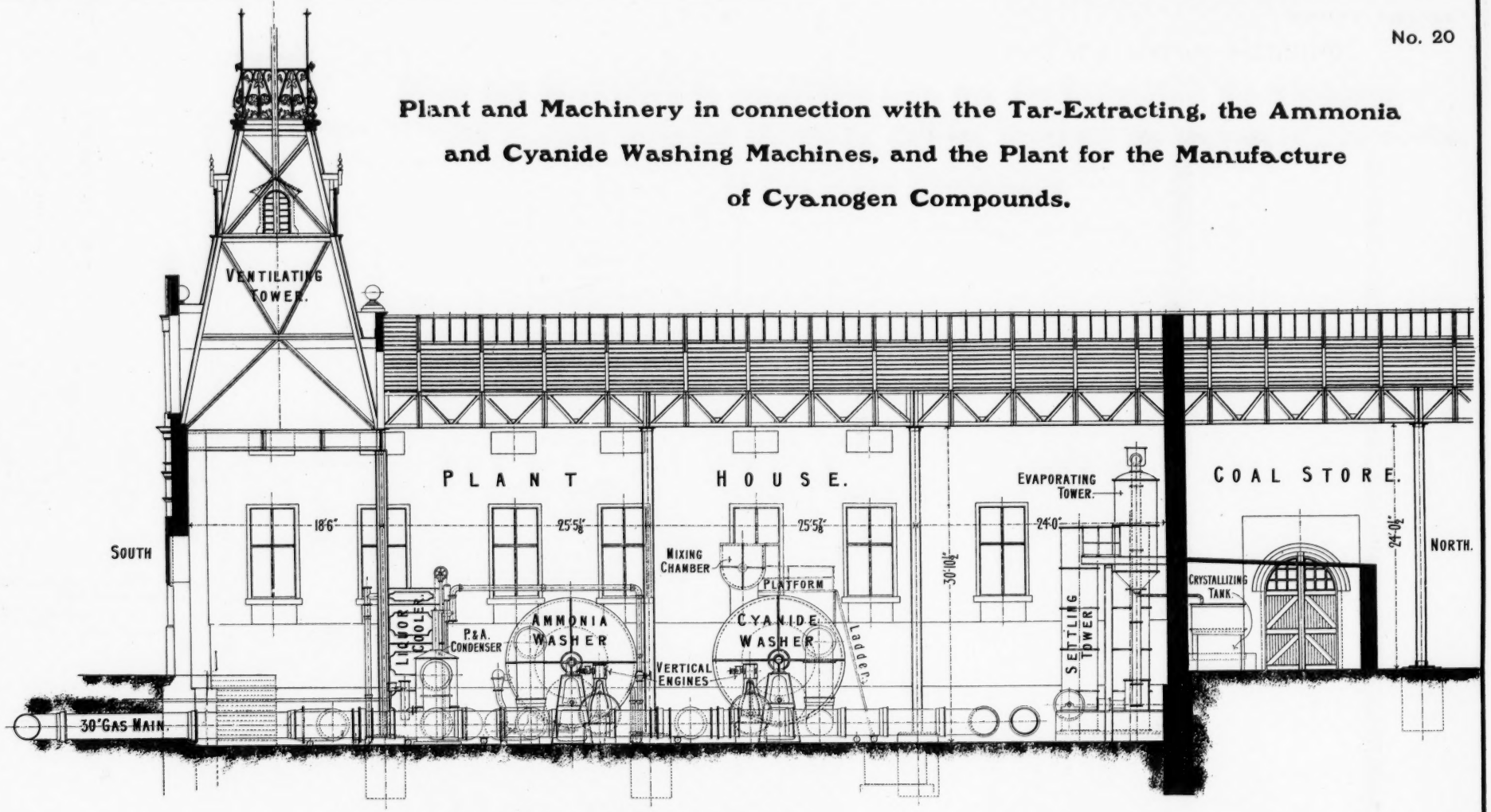
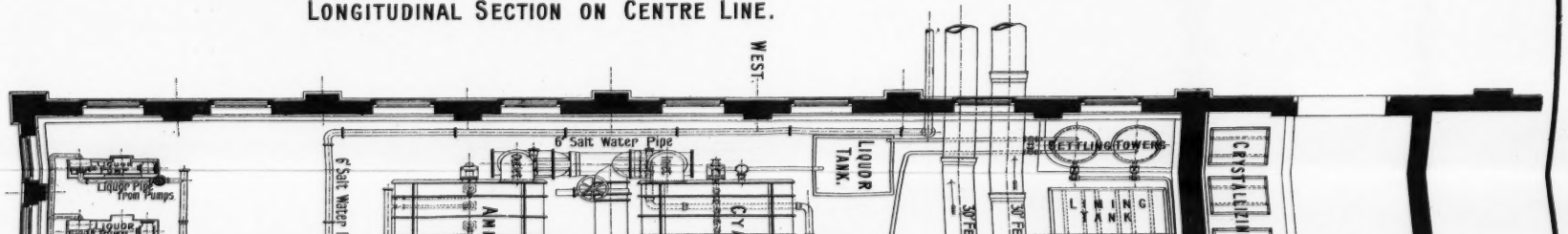
The Granton Works of the Edinburgh and Leith Gas Commissioners.

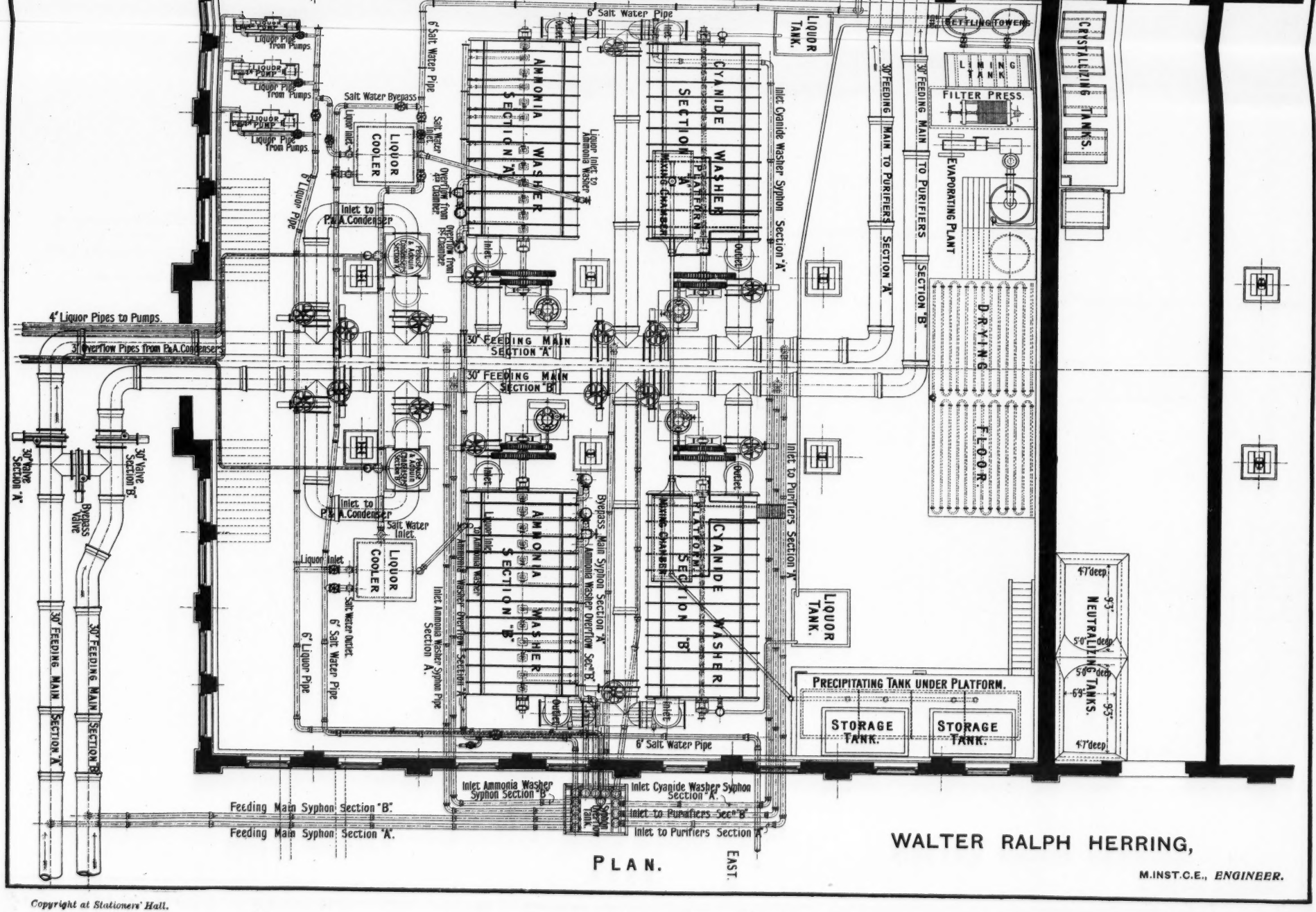
No. 20

Plant and Machinery in connection with the Tar-Extracting, the Ammonia and Cyanide Washing Machines, and the Plant for the Manufacture of Cyanogen Compounds.



LONGITUDINAL SECTION ON CENTRE LINE.





WALTER RALPH HERRING,

M.INST.C.E., *ENGINEER.*

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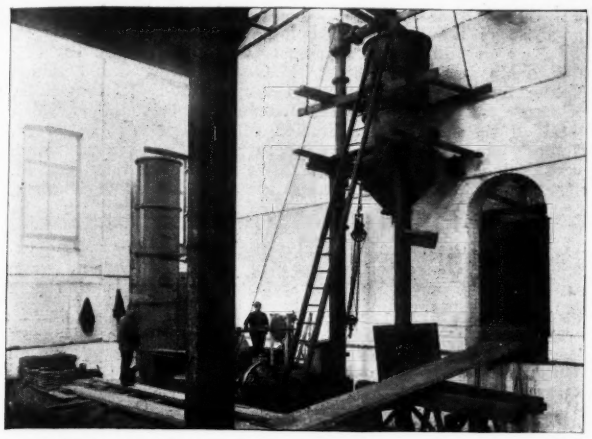


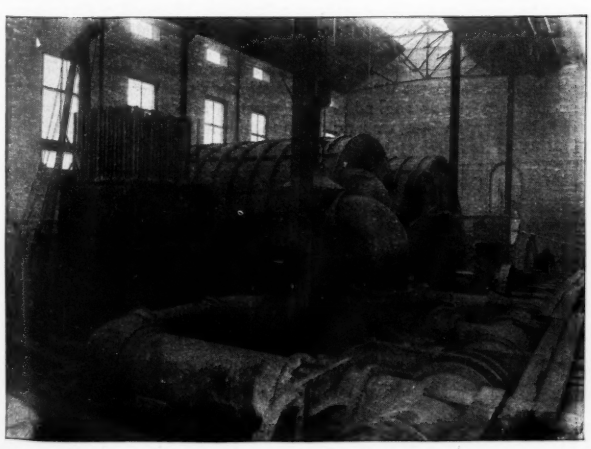
PHOTOGRAPH No. 100.—The general arrangement of the settling and evaporating plant in connection with the cyanide recovery process.

purification, the washer-scrubbers for the cyanide process, and the plant for dealing with the cyanogen compounds. As will be seen from this plate, the gas enters the building in two streams, through 30-inch pipes (see Photograph No. 98); the inlet and outlet connections branching therefrom, the main line of pipes having the bye-pass valve arranged thereon.

Little room has been wasted in the arrangement of these connections, or in accommodating the plant within the building; and

PHOTOGRAPH No. 101.—The masonry piers and girders supporting the concrete covering for the tank in the open yard.

yet ample has been provided. The gas is first made to pass through a Pelouze and Audouin condenser (seen at the back of the centre pillar in Photograph No. 98 and in Photograph No. 99), of American make. Thereafter it enters the ammonia scrubbers (Photograph No. 99), each of which is of Holmes's latest patent and make, and consists of a cylindrical vessel, 12 feet internal diameter by 24 feet long, made up of thirteen cast-iron segments, forming twelve washing-chambers.



PHOTOGRAPH No. 102.—The cooler for reducing the temperature of the hot liquor before being used in the scrubber-washers.

The cyanide scrubbers are of exactly similar size, and built upon the same lines, with the exception that, owing to the continued agitation of the washing material necessary for keeping the same in suspension for the extraction of the cyanide compounds, the chambers within which the brushes revolve occupy a larger space than in the ammonia machines. Thereafter, the gas leaves the building, still in two streams, for the purifying plant proper.

The plant-house also contains the apparatus for dealing with the cyanogen solutions produced in the washer-scrubbers. Provision has been made for producing sodium ferrocyanide cake, potassium ferrocyanide crystals, or calcium ferrocyanide solution—the latter being the process first to be tried.

The liquids from the cyanide washer-scrubbers are run into tanks, and pumped to the settling towers, and thereafter into the steam vacuum evaporator, Photograph No. 100, from which (in the event of it being cyanide cake) it is discharged on to a steam-drying floor beneath.

The whole of the drain-pipes and syphons from the plant, and the mains in the plant-house, are conducted to the outside of the building, and sealed in a separate seal-pot in a similar manner to the retort-house and condensing plant. The overflow from the latter is coupled direct to a main leading to the products works; whereas the overflow from the retort-house and condenser seal-pot flows into a cast-iron tank sunk beneath the ground at the end of the plant-house block. The object of this is to avoid the mixing of the strong ammoniacal liquor with the liquor resulting from the condensation in the retort-house, in order that the fullest advantage may be taken of the purifying properties which the weak liquor condensed from the comparatively hot gas has—it being an almost free alkaline solution, as compared with the liquors subsequently condensed, which become more or less sulphided and carbonated, particularly those resulting from the washer-scrubbers.

It may be incidentally remarked that the tank used for this purpose is an old gasholder tank removed from the Portobello works, and 35 years old at the time of removal. From all appearances, it is none the worse for its age; and it has been reinstated at the new works at Granton to do a long period of service in the future. The tank has a flat bottom, and is 40 ft. 10 in. diameter by 16 ft. 3 in. deep. Photograph No. 101 shows this tank, and the means adopted for covering it at the yard level. The tank is also used as a tar and liquor separator; the tar flowing automatically from this tank through a 6-inch main into the tar-tank at the sidings adjoining the products works, from which it is loaded into waggons for transport. The weak liquor, varying from 1 to 3 oz. strength, accumulating in the liquor tank, is normally at a temperature of about 83° Fahr. Prior to being used in the washer-scrubbers, it is reduced in temperature to the normal. By means of pumps fixed in the plant-house, the liquor is drawn from the well and made to pass through a water cooler (see Photograph No. 102), consisting of a built-up tower 6 feet square by 14 ft. 9 in. high, with a top and bottom water-chamber and 68 2-inch cast-iron tubes arranged therein, through which the salt water on its travel from the pumps at the shore to the overhead tanks, where the same is supplied to the lavatories, is made to pass at will. The salt water flows through the 2-inch pipes; the chamber itself being filled with the weak liquor from the well. The liquor passes in at the upper end, and out at the bottom. By this means, the liquor is brought down to a suitable temperature for washing purposes. The first five chambers of the ammonia machines are utilized for this purpose. By placing the ordinary syphon overflow of the washer-scrubber on the sixth chamber from the gas inlet end, the fresh water enters the machine at the gas outlet end, and the liquor (of whatever strength desired) flows out at the first overflow. The gas liquor from the well is pumped into the fifth chamber from the inlet end, and flows out through an overflow on the first chamber whereby its strength can be worked up to any degree required.

The Manchester District Institution of Gas Engineers will visit Sheffield next Saturday, under the presidency of Mr. S. R. Ogden, of Blackburn. On arrival, coaches will be in waiting to drive the members to the Grimesthorpe Gas-Works, after inspecting which the visitors will be entertained at luncheon at the Victoria Hotel by the Chairman and Directors of the Sheffield United Gaslight Company. In the afternoon there will be a drive to Baslow, where tea will be taken, and a meeting held for the transaction of formal business. The party will then return to Sheffield in time to catch the evening trains to Manchester and Bradford.

Midland Association of Gas Managers.—The members of the Midland Association of Gas Managers are visiting their President (Mr. Charles Meiklejohn) at Rugby on Thursday; and, favoured by fine weather, an interesting and enjoyable day may be anticipated. The Directors of the Gas Company and Mr. Meiklejohn will meet their visitors at the Masonic Hall at 11.15; and, after ordinary business has been transacted, they will be driven through the village of Dunchurch, and back to Rugby, *viâ* the village of Old Belton. The Directors of the Company will then entertain the members to luncheon at the Masonic Hall; and the afternoon will be spent in making a visit to the Victoria Works of Messrs. Willans and Robinson, who will supplement this kindness by entertaining the members to tea.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

Annual Meeting at Toulon.

[From Our Own Correspondent.]

From London to Toulon is about 800 miles; and the journey, if continued straight through, takes about 24 hours. The Channel crossing was calm as a millpond, and the weather was fine. Every variety of it, however, was offered during the run south. Rain at Paris, sunshine at Laroche, hail at Dijon with the fields all white, dark clouds and distant thunder at Macon—arriving at Lyons amid a general truce of the elements. There and onward, showers and swollen streams—the Saône and Rhône rivalling each other in their flooded race, until the latter absorbs the former and reaches the sea at Marseilles, impressive in its immensity and power, one of the wonders of the world. An hour or so from Marseilles—always fresh in its cosmopolitan freedom—and one arrives at Toulon in the early hours of the morning; the Mediterranean coast-line beautifully silhouetted against a silvery sea illumined by the soft light of a full moon.

Toulon, a town of more than 100,000 inhabitants, and after Brest and Cherbourg, the principal naval station of France, celebrated for its Arsenal and early associations with Napoleon—this was the *rendez-vous* for the thirtieth annual congress of the Société Technique de l'Industrie du Gaz en France. On the morning of last Tuesday, about 120 members assembled, under the presidency of M. Piaton, in the large room of the "Mairie," which overlooks the old harbour, and commands a view of one of the finest roadsteads known. Without any preliminary introduction, the President at once opened the business part of the programme by reading the Committee's annual report; it being prefaced by a list of the members deceased during the year. Of these, there were six, among them being M. Léon Mariani, of high reputation in Italy; M. Bandsept, who had been a keen investigator on the subject of incandescent burners; and M. Guéguen, the author of many publications, and for many years the Editor of the "Journal de l'Eclairage au Gaz." Of new members, 27 in all were elected, of whom nine were associates; the total number of members of the Society now amounting to 635. The library has been enriched during the year by no less than 84 books and publications. What, one may wonder, are the comparative figures for our own Institution? The subscriptions made by various gas companies to the funds of the Society reach the sum of 22,225 frs. (£889). The report of the Treasurer (M. Marquisan) was next taken, and revealed an increasingly satisfactory state of affairs. The total receipts for the year amounted to 49,241 frs. (£1969), and the expenses to 45,095 frs. (£1804); thus showing a surplus of 4146 frs. (£165). On publications alone, no less a sum than 12,415 frs. (£496) has been spent, and upon the library 1109 frs. (£44). The total capital of the Society now stands at 199,380 frs., or about £7972; being an increase upon that of the previous report of 2853 frs. (£112). These statements were received with the applause they merited, and voting papers were then handed round for the election of five members to serve on the Committee for a term of three years, in place of those retiring, but re-eligible. The successful candidates proved to be MM. Frère, Marquisan, Coze, Bachelay, and Séguin—in the order named; the only change in those retiring being the election of the popular Manager of Toulon, M. Bachelay, who was warmly congratulated upon the result. The office-bearers for the ensuing year are as follows: President, M. Deleury; Vice-President, M. Visinet; Secretaries, MM. Godinet and Thibaudet; Treasurer, M. Marquisan. This concluded the business of the first morning.

The congress room was crowded in the afternoon, when the Sous-Préfet, M. Poux-Laville, and M. Roure, the representative of the Mayor, were present. The former welcomed the members, and congratulated them on the progress of the gas industry and the many improvements made. He then presented several awards. There had been 74 candidates for the prizes of 200 frs. (£8) offered to those workmen who had the longest and best records of service; and of these 32 were recompensed. Nearly all of them had more than thirty years of work to their credit. Reports were afterwards read on the results of the various prizes and competitions annually offered by the Society. The first was on the subject of an ignition-tube for gas-engines, which had been submitted by M. Guillou at last year's congress. It had meanwhile been tested, and the required conditions fulfilled. These were that the pressure of the gas should be easily regulated, the consumption low, the tube easily replaced, and the burner properly protected. M. Guillou was therefore awarded a prize of 250 frs. (£10). Three competitors had entered for the prize of 5000 frs. (£200) for the successful automatic lighting of incandescent burners, but none was favourably reviewed. M. Th. Vautier reported (as read by M. Bouvier) on an incandescent burner invented by M. Hubert; but the general conclusion was that there was nothing remarkably new in it, and that therefore it was not deserving of any award. Of the 5000 frs. available for the most artistic gas-fittings sent in for competition, M. Charles Blanc was awarded 500 frs., M. Potron the same amount, and MM. Boulanger and Roux 200 frs.* The best papers read at last year's meeting in Paris were then reviewed, those of members of the Committee being *hors concours*, as usual: M. Delahaye on "Statistics referring to Gas and Electric Lighting in Sixty Massachusetts Towns;" M. Godinet on "A Cable-Guided Holder and Inclined Retorts at Vaise;" and M. Bouvier on "Compressor Gas-Fans." The ordinary members' papers, which obtained the usual compensation of 250 frs. (£10) were M. Guillet's on obtaining ammonia from tar and and the extraction of cyanides, M. Lencauchez's treatise on coke and its uses, M. Lecomte for his three communications on benzol enrichment, &c., and M. Laurain for his description of a swinging conveyor. M. Bachelay was also thanked for his three characteristic notes—on high-ceiling chandeliers, acetylene torch, and brick standardization—correctly described as "of practical interest, while written in a curious and original style." The Committee's report on these awards concludes as follows:

> The Committee are so convinced of the increasing importance of defending technically all our common interests, and of explaining all subjects, even of details, relating to our industry, that they commissioned last year the Secretary, M. Payet, to study two questions which circumstances made of practical importance at the time. One of these two will shortly be brought to the front by the International Commission on Photometry. We are pleased to believe that the solution proposed by the Société Technique will be favourably taken advantage of in the friendly discussions in which the representatives of our gas colleagues of other countries will take part.

This reference to the Photometrical Commission may be taken in connection with the announcement, contained in the last number of the "Journal" of the forthcoming meeting at Zurich.

Papers and Discussions.

The somewhat confusing array of reports, presentations, and awards having now been cleared away, a start was made with the list of technical papers. On the programme of the meeting, there appeared no less than thirty titles; but these were slightly reduced by the elimination of M. Sarrasin's description of his charging machinery (noticed in the "Journal" last week) and M. Rouget's "Simplex" gas-meter. I understand that the former paper will not be included in the Minutes of Proceedings, on account of the author having violated the Society's rules by publishing it before the meeting in the "Bulletin Technologique," as mentioned in the article previously referred to. It is not necessary here to describe in any detail the various papers read or verbally summarized, as they will appear in your pages in due course; but it may be useful just to mention the more important, and call attention to a few points of interest.

The De Brouwer retort-charging machine, as described by M. Laurain, was the first paper taken; and as it has already been fully brought to the notice of "Journal" readers, not much more concerning it at present need be added. Reference is made in the paper—not in any spirit of rivalry—to the stoking machinery at the La Villette works of the Paris Gas Company, but merely to remind members of what they saw there last year, and to show that a like excellent charging result can be obtained on the same principle but by some other means. The author mentions 650 kilos. (13 cwt.) of coal as capable of being put into a retort 6 metres (20 feet) long in 45 seconds; but he was careful to explain that this large quantity of coal was, of course, not put forward as a practical working one, owing naturally to the extreme heat that would be required for its proper carbonization. The author remarks concerning the length of the retorts generally adopted—6-metre retorts being too extensive a unit in an arch for an average sized works; and the conclusion is arrived at that probably retorts 4·5 metres long, with double mouthpieces, might be found a satisfactory compromise between the short and the long forms at present most usual. The drawings accompanying the paper show a pushing machine for discharging the coke, and suggestions for the introduction of water gas into one end of the retorts; the single ascension-pipes being at the other end. A beautifully finished model of the machine was exhibited at the meeting; and a glass retort was admirably charged, which drew forth warm applause from those present. In the slight discussion that followed, both M. Mallet and M. Godinet spoke, and each welcomed the machine as well adapted for existing retort-houses; but both, at the same time, adhered strongly to their preference for inclined retorts as regarded new work. Members were anxious to get away to see this novel machine actually at work at the Toulon Gas-Works; but two more papers were taken beforehand. One was an unprinted one on the "Comparison between the Capital Cost of Inclined Retorts and Horizontals (with Machines)"—a very *à propos* subject following on the previous paper. The author was M. Frère, of St. Quentin; and his contribution proved of great interest. Briefly, he takes as his basis a plant for 60 tons per day—making (say) 17,000 cubic metres of gas; there being four arches of nine retorts, 20 feet long. Coal-bunkers for 45 tons storage, or 18 hours. The prices given (which are actual figures tendered upon) are applicable to the North of France; and the results for a complete installation—from foundations to coke-conveyors, including house, and everything—are as follows.

	Francs.
Total cost for horizontal arrangement	171,250
,, ,, ,, inclined ,, ...	162,525
Difference in favour of inclined retorts . . .	8,725

* MM. Boulanger and Roux's design was given in the "Journal" for Oct. 21, 1902 (p. 1084).

On the basis of different units, the comparative prices are given thus:—

	Horizontal. Francs.		Inclined. Francs.
Per retort	4756·00	..	4514 00
,, cubic metre of gas per 24 hours	10·09	..	9·56
,, ton of coal carbonized	2854·16	..	2708·70

The author remarked upon the growing need in the gas industry of adopting to the greatest possible extent mechanical appliances. He said that "both as regards cost of installing and for simplicity of working, inclined retorts have indisputable advantages over horizontal ones." In the discussion that followed, M. Marquisan raised the old question as to the suitability or otherwise of the inclined-retort system for the carbonization of certain coals—a point at once taken up by M. Godinet from his experience at Lyons (Vaise), who referred to the charging of wet and dry coals, which affected the question more than the origin of the coals, and who claimed that these difficulties had been, and could be overcome. M. Lhomme, who said he had just returned from seeing the large inclined-retort plant at Milan, remarked that the fall of the coal into the retorts was checked by a flap-plate, so that practically any kind of coal could be used. The arguments then drifted into the amount of coke breeze produced by the different systems; and M. Godinet brought out the idea that complaints as to breeze being increased by the adoption of conveyors were not wholly justifiable, as the fact of the matter was that such plant merely rendered the breeze more noticeable than it had been before, but not that it necessarily made more of it. His experiments at Lyons had justified him in so thinking. The discussion, as indicated, was a rather rambling one, and hardly led to any definite forming of opinion; but it was useful enough in its way. After a short description by M. Sar of an arrangement of coke-quencher, consisting of a small water tower and swing spray, the meeting was adjourned, and a visit paid to the gas and electric light works, both being under the same control.

In the purifier-shed, there was erected a De Brouwer charging-machine, placed so as to command a single 20 feet retort of sheet iron with a hinged top. M. Laurain set the machine in motion, and explained its working to a large crowd of interested listeners. He then charged the retort, the top covering of which was afterwards thrown open, and an exceedingly level charge of coal exposed to view. Also in the retort-house the machine was seen actually at work upon two or three beds, each of eight retorts, 2·90 metres long. The retorts were of the usual Continental form, being about 65 cm. wide by 35 cm. deep; while 175 kilos of coal are now being put into each retort per charge, instead of the former 160 kilos by shovel. The charges examined were very regular. The accessory apparatus for the machine is only of a temporary character; and it was not lost sight of by many that, though, as I have been informed, the machine itself would cost about 5000 frs. (£200), the cost of permanent plant on a practical scale would naturally be an item of some importance. However, to sum up the impression created alike by the paper, the model, and the actual machine, it can be described as satisfactory in the extreme; the members feeling that here was a simple, strong, and (in itself) cheap apparatus likely to prove of great utility in many cases. The coke-quenching apparatus already mentioned was also seen in operation; but its advantages over the old fixed spray pipe and exhaust chimney or tower were not so obvious.

On Wednesday morning, M. Lecomte delivered, with all his usual fluency, his paper on "The Self-Enrichment of Water-Gas by its Passage through Retorts" (Dellwik-Fleischer process). It was the account of investigations made by a French Commission which visited, by invitation, the Remscheid Gas-Works, where Dellwik water gas is made and passed through coal-gas retorts. The author refers to the previous history of the subject, outlines the Dellwik-Fleischer process, describes the German Gas-Works referred to, and then deals in detail with all the figures of the experiments made on the gases separate and the gases combined, and the various actions and reactions involved. The paper will undoubtedly be read with the greatest interest, and will prove of considerable value in its relation to a subject still smouldering. M. Lecomte arrives at certain conclusions which may be just referred to here. The Dellwik-Fleischer gas contains only carbonic acid and nitrogen. The maximum number of calories possible is thus in the coke; and the working periods are much longer than in any other system. About 850 grammes of coke may be taken as producing 1 cubic metre of water gas, including all services. The increased lighting power of a mixture of 70 per cent. of coal gas and 30 per cent. of water gas, with self-enrichment, is from 23 to 25 per cent. The increased heating power under the same conditions is from 7·5 to 11 per cent. Stopped ascension pipes are greatly decreased. The light given by incandescent burners is brighter and whiter than when supplied with coal gas alone. Such, as abbreviated, are some of the important findings of this interesting and valuable paper [see p. 446]. The author has added a note to it in which he explains the working of the Junkers calorimeter, as he believes, and rightly, that its more and more frequent use necessitates such detailed instructions as he gives.

The next subject that came in for consideration was of a mechanical nature—"Conveying Apparatus for Coal and Coke." It was prepared by M. Richard, and consisted in a description of the well-known Hunt system for handling coal, as exemplified at the new Bremen Gas-Works, Zurich, Mayence, Berlin, Nancy, and Lille. At the first-named works, the coke from inclined retorts is received directly into sloping hoppers from which the Hunt waggons are supplied, and conveyed to the stores [see p. 448.] The Manager of the Nancy Gas-Works, who was present, gave some figures as to his plant; but it had not been at work long enough to afford figures of wear and tear, &c. However, some coals now cost 15·6 c. per ton from barge to stores, or, including all items, 26 c. As formerly they had cost 1 fr. 50 c. per ton, the saving was obviously considerable. Several interesting photographs and drawings illustrating the plants were shown.

The next item was not down on the programme. It was M. Cornuault (who, it will be remembered, represented and headed the Société Technique on their memorable visit to London in 1901), who gave a valuable account of the difficulties of coming to terms with the local authorities at Bordeaux, where the gas concession is shortly to expire. Then followed M. Chevalet, who explained an excellent little apparatus for testing the purity of gas on an experimental scale. In one vessel, tests on condensing, washing, and purifying gas can be effected. M. Chervet was next called upon by the President; and he emphasized the advantages in small works of controlling the retort-house operations by a pressure register, and showed what deductions, such as cleaning pipes, &c., could be drawn from the indicator paper. After two papers by MM. Casaubon and Dupoy, dealing with the constant water level of meters, had been read by their authors, it was approaching noon, and the meeting was adjourned.

Passing over for the moment the enjoyable excursions of Wednesday afternoon, it was found that there were still about fifteen technical contributions to be gone through, and only Thursday morning available. The meeting was therefore called for nine o'clock instead of half-past, and from that hour till after mid-day papers and discussions and questions followed one another in rapid succession. There were some, certainly, that did not merit a great deal of consideration, referring as they did merely to little mechanical devices for meters, burners, and mantles, &c. But, none the less, the explaining and exhibition of the latest manufacturer's novelties, however trivial, are bound to prove of some utility to gas engineers and managers scattered over a big country like France. The toleration, and even welcome, of such trivialities (as they might appear in English eyes) is a striking difference between technical gas meetings each side of the Channel. But no doubt each knows what is best for its particular circumstances.

Of other papers, M. Guillet gave some practical results of his process for the extraction of cyanides from gas, which he had brought into notice at the previous year's meeting. There seemed to be some question as to the infringement of Dr. Bueb's patent (or patents); but the author stated that there was no danger of that. Another of M. Lecomte's papers (he wrote five for this congress) that will merit attention is on the relationship between photometrical measurements, particularly French and German. Everyone knows the difficulty of reading and interpreting technical expressions of one nation in terms of another; and if some common basis can be found, it will be a blessing to many. Our adoption of the metrical system would certainly be a great step in advance, and would lead the way to other common and international standards of comparison. But this seems to be, like the Millennium, a long way off. M. Lecomte, however, puts two definite propositions in this connection before the International Photometrical Commission. With reference to this Commission, there seems to be, in some quarters, considerable pessimism as to the results of its labours (when they begin!); and no doubt its machinery is bound to be slow, ponderous, and noisy—a confusion of tongues and a Tower of Babel. At its mention at the congress, there was obviously a tendency to smile and look sceptical. But let us at all events hope for the best, and trust its obvious difficulties will be successfully overcome—sooner or later.

M. Chamon (a name well known in connection with the Paris gas negotiations) read two small papers on meters—one referring to meters for large volumes of gas, with two drums on one axle, and the other on a syphon leveller for meters, particularly those known as "Duplex," so as to overcome the errors of registration caused by tilting forward.

A neat apparatus, known by the author's name, for arriving at the density and heating and lighting values of gas, was described by M. Giroud. Some questions regarding its working and accuracy were raised by MM. Mallet and Lecomte, after which M. Bachelay obtained the attention of the meeting while he brought to notice several tamperings with, and thefts from, consumers' meters. He described these (and handed them round) in quaint phraseology, and did not lose any opportunities of emphasizing the humorous side to the flagrancies. M. Chamon took up the cudgels on behalf of the meter makers, and later was supported by M. Lacaze. The Toulon Manager afterwards gave a practical illustration of the working of his acetylene torch for lighting incandescent burners in public lamps.

A contribution to the desirable, but difficult, subject of self-igniting gas-burners was made by M. Lecomte, under the title of "The Auto-Flame: P. Canioni System." It is still our old friend platinum, but under a different, and probably better, form—more active, and lighting quicker. One advantage (or should it be disadvantage?) of the system described lies in the fact that by it the use of gas for intermittently illuminated public advertisements is made practicable—costing eight times less than for electricity—and so adds another field for gas consumption. But what about

the long suffering man in the street? An automatic extinguisher for public lamps was shown by M. Lacaze; and M. Cornuault agreed it might be especially useful in outlying districts where the lights could be extinguished at a certain time—the hours for lighting up being, of course, variable.

Means for testing the resistance of mantles were illustrated by M. Syssoyeff, after which gas-cookers received some attention at the hands of MM. Lecomte and André. The latter explained the great difficulties of introducing large cookers in hotels and restaurants, owing to ignorance and conservatism on the part of the chefs. He even ventured to suggest the supply of the cook with the cooker! And, really, on serious consideration, in Continental towns, there appears to be no valid reason why something similar should not be done. M. Pierson contributed an account of the "Pierson" suction producer, in which small coke can be used. There would seem to be some place for such plant where gas-engines are installed in any number. The interesting subject of electrolysis and gas explosions caused by electricity was ably dealt with by M. Bouvier, in a communication that will well repay consideration by gas engineers subject to such dangers. And who now-a-days is exempt?

The final paper raised the sound of laughter—not that the subject was ridiculous, but that it was incongruous. It had been prepared by M. Albert Sar—he of the coke-quenching spray, and known as an amiable colleague. Who could refrain from laughing at: "We all know of rats and mice that eat lead service-pipes, but now here is an insect, the *Sirex Gigas*, which also makes holes in them" or words to that effect? The obnoxious insect was handed round the room to be admired; while the author disclaimed any intention of his paper being considered as "technical" in the usual sense. It served its purpose as affording matter of interest—and hilarity. This having subsided, M. Cornuault immediately rose to express the members' thanks to the Committee for the past year, and in particular to the President, M. Piaton, who has been in the unique position of having occupied the presidential chair of the Société Technique du Gaz for three years in succession—at Dieppe in 1901, Paris in 1902, and here at Toulon in 1903. His valuable presidential address on the subject of gas and electricity will be remembered; and his admirable tact, consistent patience, and unflagging energy, besides his courteous conduct of the meetings, deserve the fullest recognition and warmest thanks.

I also wish to tender my hearty appreciation of the indefatigable work of the Secretary, M. Payet, who not only has done considerable technical investigation, but smoothly organizes and carries out the many functions and excursions connected with the yearly meetings. That this is no light task is well known to all those who have had anything to do with such arrangements; and more particularly are the duties arduous this year, when the list of visits and excursions is so complicated, the distances so great, and the interests so different. For example, on Tuesday evening last a dinner was offered to the members by the Toulon Gas Company. M. Fichet, the President of the Company, was in the chair, the principal guests being Vice-Admiral Bienaimé and the Sous-Préfet. Wednesday afternoon there were sails in the magnificent roadstead of Toulon, visits to a Russian man-o'-war under construction at the Forges and Chantiers of the Mediterranean, an excursion to Sanary by carriage, and a visit by boat to Les Sablettes, where the annual dinner of the Société Technique was served. Thursday afternoon there was one party for the Arsenal and another to the Gorges d'Ollioules. The same evening some left by train for Cannes, others going the following morning to Grasse direct, and visiting the electrical works at Saut-du-Loup. Thence some went to Nice, others to Grenoble, and still others to Lyons—all with works of interest to be seen, and all visits arranged for, and controlled by, the Société Technique and their Acting Secretary. The reciting of such a list is in itself sufficient to show what a lot of work and worry is involved in the carrying out of so extensive a programme. I therefore repeat that the best thanks are due to M. Payet for his urbanity and consideration for everyone.

I cannot conclude this review of the very interesting and instructive meeting of the Société Technique de l'Industrie du Gaz en France better than with repeated words of thanks to the President, the Secretary, M. Bachelay (as Manager at Toulon), for this kind attention, and also to the members for their many acts of courtesy and international goodwill.

THE RELATION BETWEEN FRENCH, GERMAN, AND ENGLISH PHOTOMETRIC MEASUREMENTS.

THE immense obstacles which at present stand in the way of a correlation of all data which involve directly or indirectly the results of measurements made according to the systems of photometry which prevail in different countries, are probably realized by very few English gas engineers. Only those whose lot it has been to have to make comparisons of the "candles per ton" which one description of coal yields with the "Hefner-units per kilogramme (or tonne)" ascribed to another coal, in order to arrive at a valuation of one coal in terms of the other, or of some common standard description, know how uncertain is the conclusion arrived at, despite the most conscientious efforts to make a fair comparison. The same remark applies to the comparison of the results of two different processes of gas manufacture, when those processes have been conducted in different countries, and the results include photometrical data determined according to the different national methods. It applies, consequently, to the returns of the working of gas undertakings in different countries. For instance, who will undertake to compare fairly the carbonizing returns of an English works which obtains 10,000 cubic feet of gas, of 14-candle power, per ton of coal, with those of a French works securing 29 cubic metres of 105-litre gas per quintal of coal, or with those of a German works which gets 280 cubic metres of gas, of 16-Hefners value, per tonne of coal? The volumes of gas made are readily brought to a common standard; but what about the illuminating power? Even supposing (which is not a fact) that the precise ratio is known between the three standards of light—the English sperm candle (or its equivalent Harcourt unit), the carcel, and the Hefner unit or the German paraffin candle—there remain two other factors which have a variable and uncertain influence on the results of the photometrical determinations. These are the type of burner used for the consumption of the gas, and the rate of consumption. There is not even entire agreement in each country as to the standard burner for consuming the gas under test, and the standard mode of burning the gas in that burner. Recently, with the same standard burner, two modes of burning gas nominally of the same quality have prevailed, even in the Metropolitan area; and the results of the two modes are so different that, according to Professor Vivian B. Lewes, gas of 14-candle power according to one mode of testing appears of only 11⅓-candle power if burned according to the other mode;* while other authorities have stated in evidence that the difference between the results obtained by the two modes is only about one candle.

Passing over the discrepancy between the results of different observers which is here displayed, it is evident that the rate of consumption or mode of burning the gas under test introduces a large variable factor, even when the standard gas-burner is the same. A change of burner introduces another variable, the effect of which, taken in conjunction with a difference in the rates of consumption, it is well-nigh impossible to determine. The standard gas-burner for most (but not all) English gas undertakings is Sugg's "London" argand No. 1; in most (but by no means all) English testing-rooms where it is used, the gas under test is consumed at the rate of 5 cubic feet per hour. The standard gas-burner in Paris is the Bengel, and the gas is burnt in it at such a rate that it affords a light of one carcel (say, 10 candles). The standard gas-burner in Germany is the Elster, and the gas is burnt in it at the rate of 150 litres (5·3 cubic feet) per hour. What relation subsists between the results of determinations of illuminating power when the gas under test is burnt in these different burners at the different rates in vogue? Is the relation a constant one for different qualities of coal gas, and the same for simple coal gas and for coal gas to which simple or carburetted water gas, or carburine vapour, has been added?

So far as we are aware, there are no trustworthy published data covering one tithe of the points raised by these questions, which have a practical significance which far outweighs the mere accidents of legislation which have called the several methods into being. We have briefly indicated some of the directions in which the want of uniformity in photometrical methods here and on the Continent causes difficulty, and prevents a proper understanding in one country of gas-works practice in another; and it only remains to express a hope that some international method—visionary though it may seem at the present time—may ultimately be agreed upon, perhaps through the agency of the International Committee which will commence its sittings next month. Pending that consummation, M. Lecomte has done valuable service by his attempt to correlate the results of two, and to some extent three, national photometrical methods. The results of his work were reported in a paper which he read at the meeting last week of the Société Technique du Gaz en France, the substance of which is given in another part of the "JOURNAL" (p. 445).

Motions of Underground Waters.—This is the title of an essay by Mr. C. S. Slichter which has lately been issued as one of the papers on water supply and irrigation published in connection with the United States Geological Survey. The author first discusses the origin and extent of underground waters, remarking that these are included only in the zone of saturated rocks, the surface of which is known as the water table or water plane. The lowest depth at which underground waters can exist is regarded as approximately six miles; but they are, of course, only recoverable in useful quantities at limited depths. Even the thermal springs arise from a level much above the geologic limit of depth. Mr. Slichter then deals with the cause and rate of movement of water through the strata, according to the size of the pores, the pressure, and the temperature, the flow being noticeably greater for high than for low temperatures. The deep zones of flow and artesian wells are finally discussed; the author dealing with common dug wells and the influence of pumping on contiguous wells, also the mutual interference of artesian wells.

* See "JOURNAL," Vol. LXXX., p. 1548.

THE COMPARATIVE LIFE OF HORIZONTAL AND INCLINED RETORTS.

THE reply of Mr. Herring (published below) to the critics of his figures as to the comparative life of horizontal and inclined retorts supplies several points which were missing from the report on the subject to the Edinburgh and Leith Gas Commissioners. That report for the purposes of the Commissioners was amply full; but not so for the review and comparisons of gas men. The letters received last week, and the supplemental information imparted by Mr. Herring, show that the figures were not so self-explanatory as they appear to be to the Engineer who knows from daily association all the conditions of the working at Edinburgh. It is true that in his report Mr. Herring gave sufficient data to show that the conditions of working must be different from those existing in England; but the data were not sufficient to enable one to define those conditions for comparative purposes. What those conditions are he now tells his *confrères*. However we, at any rate, are rather pleased than otherwise that Mr. Herring did not at the outset (and he was not called upon to for his particular purpose) give the information that he has now forwarded for publication, inasmuch as the omission has opened up a topic of a popular character for discussion. Without dipping into the details of Mr. Herring's communication, his suggestion may be emphasized, that the time is opportune for discussing the question on broader lines than those on which the debate has started.

MR. HERRING'S REPLY.

When compiling my simple little report, in response to a question put by one of my Commissioners relating to the durability of the retort-settings in connection with the Commissioners' undertakings, I had no idea that it was to receive such publicity—I might even say create so much interest among my *confrères* as it seems to have done. In itself, it is simply one of scores of such statements as are frequently presented from time to time on matters of importance affecting the Commissioners' undertakings, all of which in due course become public property as a consequence of our monthly meetings being public meetings at which the Press regularly attend.

I am always careful to go to the best possible source for the information required; and in this case I could not find a better than the books and records which have been most carefully kept in relation to the retort-settings in the whole of the works under the Commissioners. In compiling it, however, I was careful to give, as I thought, sufficient data to enable the figures to be compared with similar figures obtained from elsewhere, and to be as far as possible self-explanatory. I am still of opinion that the statement published responds to this provision; and had my critics taken the trouble to dive beneath the surface, they would have discovered a great deal more than appears on the surface.

Take, for instance, the item relating to tons of coal carbonized per foot of retort, and divide this into the number of days' working, it will be found that the weight of the charge is 2 cwt. per foot of retort per day, or 2 tons per 20-foot retort per day. This, in itself, is sufficient to show that the conditions of gas manufacture in Edinburgh—I might say in Scotland—differ from those prevailing in England.

Our retorts are 21 in. by 15 in. ⏢ section, eight in a setting, 9 feet long, set back to back, in one bench, with stop-ends in the middle. For the past ten years, they have been worked on the Siemens regenerative system; and during the greater part of the time under review (16 years), they have been worked on the basis of three-hour charges, and at a temperature very considerably higher than the average English practice, as it is found that the Scotch coal requires a higher temperature in order to obtain from it the best results both as regards illuminating power and quantity of gas per ton. For a few weeks, the Edinburgh inclines were worked on the three-hour basis merely to show that the new system would work under the same conditions as the old; but for the sake of economy in structural repairs, as a regular practice, they have been worked on four-hour charges.

The inclined settings have been by no means tenderly treated. They have had to take their share in the ordinary practical work, and have been lighted up and let down no less than five times in one case and four times in the other (see "JOURNAL" for March 10, p. 619). They have been recently repaired, and are good for considerable service yet; the retorts being in perfect shape. The No. 1 setting has worked 825 days, and the No. 2 setting 740 days. On the basis of four-hour charges, I claim that this is more than equal to 1237 days and 1110 days respectively compared with the English six-hour practice. In other words, the same weight of coal has been burnt-off in four hours as would have been put into the retorts in six hours in England; the only difference being that we work at a much higher heat, in order to get the increased carbonizing effect—the settings being entirely constructed of Glenboig material, both bricks and retorts. It does not appear to me that a fair comparison can be made excepting upon the weight of materials carbonized.

The difference between the life of the Edinburgh inclined retort settings and the horizontal settings is, in my opinion, largely accounted for by the three-hour work of the latter; and it is the price we have paid for our deficiency in producing plant. The settings themselves are also somewhat to blame. A more uniform distribution of the producer gas in the horizontal settings would undoubtedly have lengthened their lives. Here, again, however, I am of opinion that the (approximately) 350 days for horizontal settings should certainly be doubled; for they have carbonized double the weight of coal that would have been handled had the same settings been in existence in an English gas-works. They have worked three-hour charges as compared with the English practice of six hours, and, as before stated, at a very much higher heat—a heat, in fact, such as even Glenboig material will not withstand for any lengthened period.

My critics have wrongly assumed that this report has been sent forth in order to claim a superior life for inclined retort settings over those of the horizontal system. Hitherto one of the principal arguments against inclined retorts has been the alleged increased wear and tear of the settings. I have, however, always refuted this argument with words, because I could never see why an inclined retort setting, properly constructed, should not have an equally long life as a horizontal setting. I have never claimed anything superior in this respect for the inclined system. I think, however, that I am now justified in claiming to have proved that an inclined retort setting can be made equally as durable as the best-known horizontal settings of clay retorts; and as soon as my New Street settings will condescend to become useless, it is my intention to renew one or both of them with brick or tile retorts of a section and form referred to in the paper I contributed to the Gas Section of the International Engineering Congress in Glasgow.

In my opinion, it is useless to state the number of days that a retort-setting has been working. Its whole utility is based upon the tons of coal that it is capable of carbonizing during the period of its life.

As the subject appears to be ripe for discussion, allow me to suggest that those gentlemen who have already entered the field—as well as many others who have doubtless been looking on—should furnish you with their own figures in relation to the life and the coal carbonized by their retort-settings, spread over a period of (say) ten years. They might add, perhaps, the duration of the charge and the character of the retorts, as to whether they are the ordinary plastic made retort or whether they are of brick or tile construction. Such a compilation would be of inestimable value to the industry, and it could be published in such a form that carping critics could not take advantage of the information to the detriment of those who had the courage to publish it.

M. DE BROUWER, of Bruges, also writes: "In the editorial paragraph on 'The Life of Retorts,' in the number of the 'JOURNAL' for the 5th inst., you ask for information on that interesting point. If some figures from abroad can help you, I can give you the following data on the exact practical life of the retorts at Bruges. But I am inclined to believe that our retorts in Belgium last longer than those in England—at least an experiment made some years ago with English retorts led me to think so. The ten ovens last rebuilt (all generator ovens of 11 retorts) lasted respectively 828, 821, 710, 920, 743, 850, 1083, 1088, 1036, and 805 days. Before the introduction of generator firing, the actual life of the retorts did not exceed 340 days."

OBITUARY.

We regret to record the death, in his 46th year, of M. PAUL DURAND, the Managing-Director of our French contemporary "Le Gaz" and of the two other technical publications associated with it—"Le Constructeur d'Usines à Gaz" and "L'Annuaire de l'Industrie de l'Eclairage et du Chauffage par le Gaz"—in which position he succeeded his father, the late M. Emile Durand. The deceased gentleman was intended for the gas engineering profession; and with this object he was placed with M. Coindet, at Rouen. He remained there from August, 1873, till June, 1876, when he entered the service of the Paris Gas Company as an inspector. Shortly afterwards he had to commence his military duties, at the close of which he resumed his position with the Company. He remained with them until his father found the work of conducting the above-named publications too heavy for him in his advancing years; and then he availed himself of the assistance of his son. M. Emile Durand died in March, 1886, and from that date entire responsibility passed into the hands of the gentleman who has just been removed. M. Paul Durand had the valuable assistance, in technical matters, of M. Jouanne, who was associated with his father; and he will continue the work on behalf of Madame Durand.

By a somewhat singular coincidence, we record, in another part of the "JOURNAL," in the notice of the proceedings at the meeting of the Société Technique last week, the death of M. GUÉGUEN, the Editor of the "Journal de l'Eclairage au Gaz"—a position which he had held for some years. The deceased gentleman was probably more conversant with the chemical than with the constructional side of the gas profession; but he was the author of a comprehensive treatise on the municipalization of gas undertakings—a question to which, in view of the agitation which has been going on in Paris over the gas question, considerable importance has been attached in the French capital.

COMMUNICATED ARTICLES.

SOME REMARKS ON GASEOUS FIRING.

By Arthur Valon.

Twenty years ago, the great question of gaseous firing was fought out, and the principles that emerged from the keen discussions which then took place, have only become more firmly established as time has passed away. Some of the theories then fought most bitterly, are to-day the axioms which govern the construction of the modern retort-setting. The axiomatic stage, however, has its disadvantages. Those who went through these memorable discussions on the subject, or who have carefully studied the records and thought-out the whole question, know the premises on which the principles are based and their relative value; but, as time goes on, the principles are accepted with too little inquiry into their foundation, and are assumed too much as a matter of course.

To read the discussion on Mr. Whyte's paper at the recent North of England meeting and the comments made in the "Journal," it would almost seem that the trials and errors (some of the latter more fruitful than the truth), the debates, and in a word the work of the first half of the eighties is forgotten. A fairly wide acquaintance with gaseous furnaces and settings still further confirms this impression. Comparatively few of them are very good; while many are not only bad in detail, but often violate elementary principles.

The question raised in the discussion of Mr. Whyte's paper—of generator *v.* regenerative settings—should be simple enough if the premises are known, as it is one of calculation. In a generator setting, the secondary air is heated directly from the furnace; while with a regenerative setting, the secondary air is heated wholly or partially by the waste heat from the setting, which if not thus utilized would be lost. The question therefore is: What is the value of the heat recovered? This evidently depends entirely on the amount of heat absorbed by the secondary air from the waste gases and taken back into the setting.

The secondary air cannot, of course, be heated to a higher temperature than that at which the waste gases leave the setting; and the maximum economy will, therefore, be effected when the final temperature of the secondary air and the initial temperature of the waste gases are as nearly as possible identical. A little calculation will show that if these conditions were realized, the fuel used in a recuperative furnace would be somewhere about 28 per cent. less than that necessary to do the same work with a simple generator. This economy, however, would probably never be reached even with the most elaborate recuperators; and with the usual arrangement of flues the saving is considerably less.

It is very generally assumed that, because air rapidly absorbs heat, a short length of flue is all that is necessary in a recuperator. But it seems probable that the factor which governs the length of travel is not the capacity of the air to absorb the heat, but the capacity of the wall of the flue to transmit the heat from the waste gases.

Experimental data of the conductivity of different substances—especially at high temperatures—is very deficient; and there is no very sure ground to go on in determining the actual length of flues required in a continuous recuperator in order to recover all the theoretically available waste heat. But experience seems to show that the saving actually effected in simple forms of recuperator does not amount to more than 18 per cent. This discrepancy between the possible saving and the economy actually effected, is probably due to the low conductivity of the walls of the recuperator. Many attempts have been made to approximate nearer to the theoretical economy; but the increased cost and up-keep of an elaborate recuperator more than counterbalance the saving in fuel.

It is greatly to be desired that more definite information should be obtained in regard to the temperature to which the secondary air is actually heated in practical working than is at present available. The difficulties in the way are, of course, great. It is almost impossible to obtain the actual temperature of the air within the ordinary atmospheric range, because of the difficulty of protecting the thermometer from radiant heat; and with every rise of temperature the difficulty increases. This may possibly be the explanation of the apparently paradoxical results of the experiments at Seaham.

The reintroduction of outside generators where the gas for heating several settings is made in one producer, raises an interesting question of balanced gains and losses. The primary gases in this case—instead of being introduced into the setting at a high temperature—become cool by travel through a long flue; and if the gases are cooled to a comparatively low temperature, the heat lost would be sufficient to cause an increase of 40 per cent. on the fuel used in a self-contained furnace. This seems a large amount; and although experimental data as to the actual temperature of the primary gases is not very reliable, the figure is sufficiently startling to make careful inquiry desirable. So much for possible fuel losses and economies. In practical working, these must be balanced against other items—such as interest, repairs, and labour; so that what is economical in one case, may not be so in another.

The simplest gaseous furnace requires care and attention, which unfortunately in too many cases are lacking; and ignorant and careless handling is probably responsible for fuel losses far greater than the difference between generator and regenerator. Simplicity in construction, and consequently low outlay and ease of control, are points hardly, if at all, less important than that of fuel consumption; and if the latter does not get more than the proper amount of attention, the former certainly get less.

Settings, although supposed to be based on the same principles, differ widely in details of construction. In most, the furnaces have firebars; some have solid bottoms; the travel of the gases varies; the size of the flues and nostrils differs; the producer gas meets the secondary air sometimes in one stream, sometimes in several.

To take the last point alone. The object in breaking up the stream of gas is, no doubt, to distribute the heat along the retorts evenly. But this result seems to be at least equally well attained by the other method; and if so, here at once is a needless complication, and one which renders the balancing of the furnace much more difficult.

If the primary gases meet the secondary air in one stream, it is quite easy to adjust the amount of air to the almost exact requirements. But where the primary gases meet the secondary air at a number of points, this is not nearly so simple; and it is more than probable that a larger proportion of secondary air is used than should be required, with the consequent loss of temperature and increase of waste heat.

But whichever methods are the best, it seems strange that, after twenty years of accumulated experience, the gas industry have not yet agreed as to the best details in furnace and setting. The fight which raged so furiously over the principles of gaseous firing, appears to have used up all the available energy in settling those principles; and it is probably not any too much to say that more than half of the settings now put in are not a whit better than those of 17 or 18 years ago. This ought not to be; and since the principles have been settled for so long, it is surely time that the constructive details were settled also.

FANS IN GAS-WORKS.

(*Continued from p.* 213.)

By R. Gordon Mackay, Assoc.M.Inst.C.E., Member of the Berlin Section of the Society of German Engineers.

Part V.—Application of the Fan for the Purposes of Purification.

This treats of a more or less important part of the use of the centrifugul fan in gas-works, and is perhaps not of such vital interest as the matter dealt with in Parts I., II. III., and IV. It appears that if a small percentage of the atmospheric air be introduced into the gas somewhere in the neighbourhood of the condensers, that the subsequent purification is simplified, and that whereas before it was necessary to remove the spent lime and revivify the spent oxide rather more often than convenient, it becomes possible to utilize these reagents for a greater length of time. Whether this small admixture of atmospheric air causes a deterioration of the lighting power is for a gas and not a fan engineer to say; but it would appear from actual practice, as well as the reliable statements of many first-class engineers, that the introduction of 4 per cent. of atmospheric air causes no appreciable difference in illuminating power of the ultimate gas supply. Taking this as fact, there is no direct benefit from the introduction of pure oxygen, which by some is thought to have an occult influence not possessed by atmospheric oxygen; while there is the undoubted benefit of the metered nitrogen, which must aid in that ever-present desideratum of directors' boards, the possible reduction of the price per 1000 cubic feet.

(1) *Lime Purifiers.*—Dealing first with lime purifiers, it appears that many excellent experiments have been made with regard to a possible reduction in the enormous amount of labour involved by removing the spent lime from the boxes. Upon the large works around London, such an operation is of great interest; and one must naturally wonder why some renowned R.A. has not depicted such scenes, instead of covering his canvas with the portraits of lovely unknowns and rich burghers. But it is to be feared—and rightly so—that there is not room for such romantic sentimentalism in gas engineering; and so it is probable that the engineers-in-chief would willingly forego this interesting operation if another and as effective, though less costly, method of ridding the gas of its attendant impurities were met with. To renew the lime and get rid of the unpleasant odour emitted from the refuse, a current of air was forced through after the gas had been diverted to another box. The bad-smelling sulphide of lime was thus converted to sulphate, and the ammonia was driven off, leaving the hydrate and the carbonate of calcium unchanged. The gas lime so became inodorous; but the fumes passing off possessed in no small way the evil qualities of their parent. So that these also were necessarily purified by passing through an oxide of iron box, which absorbed the sulphur and was itself afterwards revivified by oxidation. Such oxidation being a species of combustion, the purifier became immoderately warm; and the process

was certainly not of sufficient benefit to warrant its universal adoption.

With the forced admission, by means of a small centrifugal fan, of a certain amount of air at the condensers or other convenient part of apparatus, a very creditable result appears to be obtained. It is said that about 2 per cent. of introduced air enables the lime (which previously removed the carbon dioxide only) to completely purify from not only the carbon dioxide, but the sulphuretted hydrogen and some of the sulphur compounds accompanying. With the usual sulphur limit in force—viz., 17 to 20 grains per 100 cubic feet—from 3 to 3½ per cent. of atmospheric air has been introduced without deterioration of lighting power; while a marked economy in the use of the lime was felt, and the spent lime was inoffensive, and the increased quantity of gas due to the metered nitrogen was a source of revenue to the company. Such results, of course, are largely brought about by the special knowledge shown in heaping the purifying material; the amount of gas purified per unit of the material increasing in indirect proportion to the thickness of the lime, as would certainly be expected. This was shown by some results given by Mr. T. Forstall in a paper read before the American Gaslight Association in 1875,* where an average yearly result of 9050 cubic feet of gas was purified by one bushel (70 lbs.) of unslaked lime when dry and stacked in six layers of a total depth of 12 inches; and as much as 17,290 cubic feet per bushel when wet and in nine layers of a total depth of 54 inches. The after-treatment of the lime varies in different generating stations; some using it to make up the ground, and others burning it again for re-utilization purposes.

(2) *Oxide of Iron.*—It must have been a strange patent law that allowed one known by the name of Laming to take out a specification for renewing oxide of iron by exposure to the action of the atmosphere; but nevertheless it is said that not only did Laming patent this process of revivification, but that it was subsequently rediscovered by Evans, and then applied first in Great Britain. The action of the sulphuretted hydrogen is shown in two formular operations; the ultimate aim being the conversion of the moistened ferric oxide into ferrous sulphide and sulphur—

$$Fe_2O_3 . H_2O + 3H_2S = Fe_2S_3 + 4H_2O$$
$$Fe_2S_3 = 2FeS + S$$

It is when this action is complete that the residue, or spent oxide as it is called, is removed and exposed to the influence of the atmospheric oxygen, with the consequent reduction of the ferrous sulphide to iron and sulphur, and the desired reoxidization of the iron. Generally, the climatic conditions in vogue in this little island of ours afford sufficient means of damping the renewed oxide. Such spontaneous oxidation necessarily produces heat, which careful piling prevents from becoming excessive; and the revivified oxide possesses its properties not only unimpaired, but often even in an increased degree. The following are illustrative of the stages gradually approaching to the limit of sulphur saturation:—

After 1st working,	6	per cent.	by	weight	of sulphur.
,, 2nd ,,	12	,,	,,	,,	
,, 3rd ,,	14	,,	,,	,,	
,, 4th ,,	19	,,	,,	,,	
,, 5th ,,	24	,,	,,	,,	
,, 6th ,,	29	,,	,,	,,	
,, 7th ,,	35	,,	,,	,,	
,, 8th ,,	45	,,	,,	,,	
,, 9th ,,	51	,,	,,	,,	
,, 10th ,,	56	,,	,,	,,	

The small percentage of atmospheric air forced by the fan into the gas, allows a partial revivification of the spent oxide without withdrawing the charge, and so produces a saving in the labour of opening, emptying, and refilling the oxide of iron purifier. If the material did not display such persistently adhesive properties, it would have been possible to totally revivify until saturation was reached; but owing to the peculiar shrinkage and settling down of the material upon the grids, it is impossible to save more than about five or six operations by applying the fan blower to forcibly pass air through. Nevertheless, this prolonged activity is well worth the small first cost and the expense of power for driving. If it be necessary to pass the air through a meter before mixing it with the gas, the engineer will find it better to use a fan blower with two inlets as free as possible, and push the air through the meter, rather than use a fan exhauster drawing through a meter; it being desirable to grant the fan as free a suction as is compatible with existing circumstances.

Incandescent Oil-Burners for Lighthouses.—At the *conversazione* of the Royal Society last Friday, Mr. T. Matthews, M.Inst.C.E., the Engineer-in-Chief of the Trinity House, showed some incandescent oil-burners which have been designed by him, primarily for use in the Trinity House lighthouse service. The arrangement, like that of most of the other exhibits, is too elaborate to be understood by mere verbal description; but it may be stated that the intensity of a single mantle-burner for flashing lights is 1100 candles, and the consumption of oil one pint per hour, while the intensity of a triple mantle-burner, for fixed and occulting lights, is 2700 candles, and the consumption of oil is three pints per hour.

* See "JOURNAL," Vol. XXVI., p. 364.

TECHNICAL RECORD.

RELATION BETWEEN FRENCH AND GERMAN METHODS OF PHOTOMETRY.

By A. LECOMTE.

[Abstract Translation of a Paper read before the Societé Technique du Gaz en France.]

Nothing is more difficult to a French gas engineer than the interpretation of the interesting technical communications of his English and German *confrères*. In the first place, standards of measurement are different, while the ratios between different standards are far from being precisely fixed. Modes of testing differ; and, finally, to complete the confusion, each country has a different way of expressing the results of its tests.

The French mode of photometry appears to be more rational than the German; and it is at last being followed in England. The endeavour is to make each burner return the maximum illuminating power which it will afford—that is to say, a flame of fixed intensity is employed. The Bengel burner, which is used in France, is merely a multiple-jet burner, and like jet-burners possesses the advantage that the light afforded is proportional to the height of the flame, whatever the volume of gas burnt.

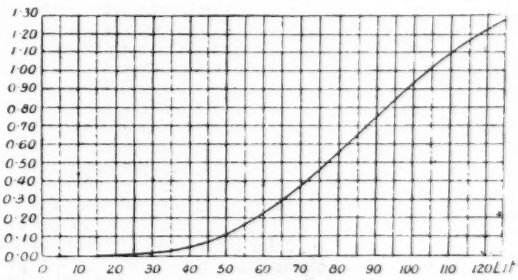


FIG. 1.

The above diagram (fig. 1) shows the results of a trial of the Bengel burner at different rates of consumption. An inspection of the curve shows that between the rates of 85 and 125 litres (3 to 4·4 cubic feet) per hour, the light afforded may be taken as virtually proportional to the gas consumption. On the other hand, the Sugg and Elster burners are of more perfect construction than the Bengel, and give a nicer and more shapely flame. The last-named burner will consume gas of widely different qualities without giving a smoky flame, whereas the two former are far more sensitive to changes in quality. For instance, on burning the same gas in the three burners, it may be found that, on varying the quality from 81 to 125½ litre gas in the Bengel burner, which signifies a gain in quality of 35 per cent., Sugg's burner shows an illuminating value of 9·7 to 18·3 candles—a gain of 88 per cent. The Elster burner could not go beyond a consumption of 90 litres per hour without smoking, corresponding to a gain of 42 per cent., when the Bengel burner showed a gain of only 28 per cent. This burner is therefore suitable for gas of medium quality, yielding a light of about 10 candles at a consumption of 105 litres (3·7 cubic feet); but it does not favour gas of higher illuminating power. When the Bengel burner shows a gain of 1, the Sugg affords a gain of 2·6, and the Elster one of 1·5. It may be added that the condition laid down by MM. Dumas and Regnault, in the directions for gas-testing in Paris, to the effect that the 105 litres per hour are to be burnt under a pressure of 2 to 3 mm. of water (say 1-10th inch) can only be complied with in the case of certain samples of coal gas, which contain very little carbonic oxide and no carbonic acid. With water gas and ordinary processes of purification, the pressure at which the gas issues from the burner reaches 4 mm. (0·16 inch).

With regard to the value of the Hefner unit, a number of documents have been consulted. M. Monnier, in 1883, found that the English standard candle, giving a flame 46 mm. (1·81 inches) in height, afforded a light of 0·120 carcel, while the German standard candle gave a flame of 50 mm. (1·97 inches), with a light of 0·134 carcel. A Committee of the German Association of Gas Engineers in 1891 found the English candle to be equal to 1·129 Hefners, and the German candle to 1·223. It may be thus deduced that, according to the English candle, the Hefner lamp gives a light equal to 0·093 carcel, or, according to the German candle, a light of 0·1095 carcel. In 1884, M. Violle gave a table, in which the value of the light of the German standard candle was stated at 0·127 carcel, and that of the Hefner lamp at 0·114 carcel. But M. Violle has since explained that this high value for the Hefner light was probably due to the tests in 1884 having been made on the second Hefner lamp constructed, which did not agree with the lamps actually in use. Some other values for the Hefner unit found by different observers are: 0·092 carcel by M. Laporte; 0·096 carcel by Mr. Dibdin, in 1899; 0·0885 carcel

by M. Croizat in the same year. Schilling's "Gas Engineer's Almanack" for 1903 contains the following table:—

—	Hefner Unit, 40 mm. Flame.	German Paraffin Candle, 50 mm. Flame.	(English) Candle, 45 mm. Flame.	Carcel.
Hefner unit	1·00	0·83	0·87	0·08
German candle	1·20	1·00	1·14	0·10
English ,, ...	1·14	0·95	1·00	0·09
Carcel	11·85	9·60	10·30	1 00

It follows that, from the more trustworthy documents, the value of the Hefner unit may range from 0·08 to 0·114 carcel. Hence, according as one or the other value is taken, the results will be 42·5 per cent. too high or too low.

Fortunately, M. Paul Mallet desired the author to undertake investigations on water gas at Remscheid in Germany, as reported in another communication; and a photometer of the Dumas and Regnault pattern, kindly lent by M. Heeley, was taken, and some careful observations were made which give a more definite value for the Hefner unit in terms of the carcel. The most practical method would have been to compare the Hefner lamp directly with the carcel; but, unfortunately, the arrangement of the photometer bench did not admit of this, and it was necessary to resort to another method, which the description will show to be equally exact. For the investigations on water gas, the Dumas and Regnault photometer, with carcel lamp, balance, and Bengel burner, was set up on the same gas service as an Elster photometer that belonged to the gas-works. This photometer is of the Bunsen type. One of the lights is fixed at one end of the bench, and the other—the Hefner lamp—is mounted on a carriage which also supports the photometer disc at a distance of 368 mm. (14½ inches) from the lamp.

The tests were made on the gas simultaneously on the two photometers. As soon as the measurement was made, and the value of the gas checked by reference to the carcel with a consumption of 10 grammes of oil, the Bengel burner was transferred from the Dumas and Regnault photometer to the Elster photometer, to replace the Elster burner. The consumption in the Bengel burner was reset at that which expressed the quality of the gas in the test against the carcel lamp. This resetting took perhaps five or ten minutes; but as the burner had not had time to cool, it regained in this time its proper action, and afforded the light of one carcel. It then only remained to measure the distance from the burner to the screen on comparison with the Hefner standard. The results of measurements made in this manner are shown in the following table:—

Quality of the Gas on Comparison with the Carcel.		Illuminating Power for the Rate of 150 Litres (=5·3 Cub. Ft.) per Hour.	Distance (D) in Millimetres.	Ratio $\left(\frac{D}{368}\right)^2$	Value of the Hefner Unit in Terms of the Carcel.
Litres.	Cubic Feet.	Hefners.			
164	5·79	7·30	1186	10·38	0·0964
150	5·30	9·70	1202	10·66	0·0938
138	4·87	11·00	1196	10·55	0·0948
134	4·73	11·25	1190	10·44	0·0957
127	4·49	12·30	1182	10·30	0 0972
127	4·49	12·80	1200	10·61	0·0942
124	4·38	13 00	1192	10·48	0·0954
122	4·31	13·50	1204	10·70	0·0935
116	4·10	14·50	1197	10·59	0 0945
109	3·85	15·40	1176	10·20	0·0980
108	3·81	15·50	1198	10·60	0·0943

The mean values deduced from these results are—

The Hefner unit is equal to 0·952 carcel.
The carcel is equal to 10·5 Hefner units.

The carcel showed a variation during these tests of between 39·5 and 43 grammes of oil consumed per hour; but this variation would be of no importance in this instance, because the Bengel burner, as already shown in the diagram, gives practically a straight line for its curve over this range of light. It was noticed that the Hefner lamp was a remarkably constant standard, and there was rarely any necessity to touch its flame. The greatest difference between the highest and lowest readings was 5 per cent., which was satisfactory.

M. Grébel, in a communication on an analogous subject, brought up the difficulty of correlating results obtained in France and in other countries, even granting that the relation between the standards of light was settled, owing to the difference in the types of standard gas-burners used. For instance, supposing Paris gas has a quality of 105 litres per hour per carcel, and that the English standard candle is equivalent to 0·112 carcel (or 8·92 candles equal one carcel), it would be found that the Paris gas would be equivalent, at 5 cubic feet, or 141·57 litres, per hour, to 8·92 × 141·57÷105 = 12 candles, or three-fourths of the illuminating power of (most) London gas. But M. Cornuault, in 1883, had pointed out that the difference was in reality much less, because the London type of burner—the Sugg—consumed more gas than the Bengel, and had a higher efficiency. The Sugg burner, tried in Paris, showed 14·7 candles for gas consumed at the rate of 5 cubic feet per hour.

The same thing is observed on comparing the German with the French method of photometry. The Paris gas, affording 1 carcel, or 10·5 Hefner units, for a consumption of 105 litres per hour, would give 10·5 × 150 ÷ 105 = 15 Hefners. But with regard to the relative qualities of Paris and Berlin gas, investigations have proved that Paris gas, tested according to the German method, would give 15·8 Hefners. In this instance again the Elster burner is more favourable to the gas than the Bengel burner.

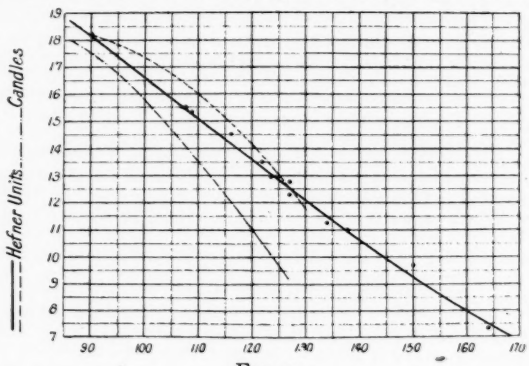


FIG. 2.

The accompanying diagram (fig. 2) shows the relation between the qualities of gas, as determined by the French and German methods. The horizontal lines indicate rates of consumption in litres per hour, and the vertical lines Hefner units. The black line shows the results of these investigations. The curve composed of dashes only shows further the results of investigations undertaken by the Photometric Committee of Dutch Gas Engineers in 1895. The slight difference between this curve and the black line which represents the results of the present investigation is due to the standard used by the Dutch Committee having been a gas-burner different from the Bengel and Elster burners, and designated the standard gas-lamp. The curve composed of dashes and dots shows the relation between the quality (or *titre*) of gas according to the French system, and its illuminating power according to the English system; but in this case the vertical lines denote candles and not Hefner units. These curves are deduced from the report of the Dutch Committee.

In conclusion, the author trusts that this paper will prove of service to those of his colleagues who have to study reports on new methods of carbonization or enrichment, or on new apparatus in use abroad, by enabling them to judge whether it would constitute an advance to adopt foreign procedures. It may be hoped that the International Committee on Photometry, appointed by the Gas Congress of 1900, will settle: (1) A secondary standard, bearing a definite relation to the Violle standard, more quickly made ready for use than the carcel, requiring no weighing, but merely the measurement of the height of a flame, and more powerful than the Hefner standard. (2) An official ratio between results obtained by the use of photometrical methods peculiar to each country.

THE DELLWIK-FLEISCHER PROCESS OF CARBURETTING WATER GAS BY PASSING IT INTO RETORTS.

The following is an abstract translation of a paper read by M. Lecomte before the meeting of the Société Technique du Gaz en France last week.

The mixing of water gas and coal gas at works where both descriptions of gas were made was originally carried out before the gas entered the purifiers. Later, the water gas was passed into the hydraulic main; and it was found that there was a slight improvement in the illuminating power of the mixed gas. This must have been due to the water gas having been carburetted at the expense of the tar in the different pieces of apparatus through which the gas passed. Finally, in November, 1902, Herr H. Dicke, the Chief Engineer of the Dellwik-Fleischer Water Gas Syndicate invited some French gas engineers to visit the Remscheid Gas-Works, where water gas was being made and carburetted by being circulated through the retorts after the manner of the new process of enrichment described by Professor Vivian B. Lewes, and invented by Herren Dellwik and Fleischer. A Committee of Frenchmen—comprising MM. P. Mallet, Heeley, Frère, Thibaudet, Peltré, and Larbitray, went to Remscheid in November, 1902, in response to this invitation. The author was requested by M. Mallet to undertake on behalf of the "Société des Usines à Gaz du Nord et de l'Est" the task of proving whether the circulation of the water gas through the retorts during the distillation of the coal was attended by any gain in illuminating power and in calorific value; and if so, what was the extent of the gain. The tests made for this purpose were carried out in the presence of Herr Messerschmitt, the

Chemist, and Herr Spitzer, the Engineer; and the results are recorded in the sequel.

In 1883, M. Guéguen, in his paper on the "Chemical Theory of the Manufacture of Illuminating Gas," showed that the hydrocarbons which impart to coal gas its illuminating power are by no means stable, and that those especially in which the most carbon is condensed are decomposed if they are left too long in contact with the red-hot walls of the retort—thereby giving up part of their carbon, which becomes retort-scurf, and forming gases which are very much less highly illuminating. In order to hurry the vapours and gas out of the retort as rapidly as possible after their formation, M. Guéguen advocated two methods of procedure: (1) To conduct the distillation of the coal under a certain degree of vacuum; and (2) to pass a stream of gas, which was inert, or at least had no harmful action, into the material undergoing carbonization.

The first procedure has been partially followed owing to the more and more general use of exhausters. In regard to the second, M. Guéguen commended the method employed by Thénins in 1862, which consisted in passing over the mass of material undergoing carbonization in the retort a small stream of highly superheated steam. The steam was decomposed partially into carbonic oxide and hydrogen; but the vapours and gas formed could not linger in the retort, but were rapidly hurried out into the ascension pipe, perhaps by the gas produced, or perhaps by the steam. The same thing occurs in the Dellwik-Fleischer process, but with the difference that, instead of using steam or an inert gas, it is water gas which is passed into the retorts and carburetted at the expense of the tar whose decomposition it has prevented. A tribute should, however, here be paid, in passing, to M. Guéguen in respect of his exhaustive study of the subject 20 years since; for his paper is still quite trustworthy and may be consulted with advantage.

In 1893, M. Jouanne read a paper on "A System of Distillation which causes an Increase in the Yield and the Illuminating Power of Gas, together with Simultaneous Production of Carburetted Water Gas." This process consisted in injecting steam, superheated to the highest possible extent, over the mass of incandescent coke. The most interesting point is that M. Jouanne stated that he had secured an increased yield of from 1430 to 1790 cubic feet of gas per ton of coal, without any falling off in the quality of the gas.

Herren Dellwik and Fleischer have succeeded in carrying into effect what M. Guéguen had proposed from theoretical considerations, and what M. Jouanne had outlined in practice, with the interesting result mentioned. Actually the steam greatly cooled the mass of incandescent carbon, and so diminished the yield of gas while the production of carbonic acid was favoured. For, though water vapour is decomposed in the presence of incandescent carbon into carbonic oxide and hydrogen, yet, if the temperature is not sufficiently high, carbonic acid is formed in place of carbonic oxide. In the Dellwik process, the water gas is made independently, is washed, and then stored in a small relief gasholder, from which it is passed into the retorts during the first three hours only of the carbonization of each charge. Carbonization is completed in six hours in inclined retorts; and the entering water gas amounts to nearly 30 per cent. of the total volume of the gas made. The charge in each retort amounts to about 485 lbs.; and during the first three hours there are passed into it about 880 cubic feet of water gas, or (say) 290 feet per hour, or 11½ lbs. of gas raised to the temperature of 600° C. (1100° Fahr.). This gas takes up somewhere about 940 calories per hour from the retort, which is equivalent to the heat produced by the combustion of ⅓ lb. of coke—an insignificant quantity. On the other hand, the large volume of gas admitted to the retort at the moment when the richest gas is being made, rapidly withdraws from the action of the hot walls of the retort the gas and vapours which are rich in carbon. In fact, it has been found that the retorts become but little coated with scurf, and the trials to be reported later on indicate that the Dellwik-Fleischer system solves the problem set by M. Guéguen.

Remscheid is a town of 70,000 inhabitants; and its gas-works distribute about 123,500,000 cubic feet of gas per annum. The price to private consumers is about 3s. 6d. per 1000 cubic feet. Owing to successive extensions, the gas-works contain a large number of different types of apparatus. The retort-house has seven settings each of nine through retorts, having mouthpieces with self-sealing lids. The settings are provided with Siemens regenerators. At the time of the author's visit, only two of the seven settings were in use. The last new bench contains three settings each having nine inclined retorts on the Coze system. These three settings were all in use; and it was through these inclined retorts only that the water gas was passed, entering them at the upper end. The charge of coal in the horizontal retorts is about 300 lbs.; and it is worked off in 4 to 4¾ hours. The charge in the inclined retorts is 485 lbs.; and it is worked off in 6 hours. The coal used (Nordstern, Zollverein, and Noisette de Mont-Cenis) contains but little sulphur, and, using exhausters, gives only the moderate yield of 9330 to 9690 cubic feet of poor gas per ton.

Herr Borchardt, the Manager of the Remscheid Gas-Works, is the inventor of an ingenious charging and drawing machine. The two horizontal settings require two stokers and another man, making in all six men per twenty-four hours for the carbonization of about 14 tons of coal. The quantity carbonized per man per diem is therefore about 2⅓ tons. The three Coze settings require two men on the lower and one on the upper stage, as well as a coal trimmer, or eight men in all per twenty-four hours, in which time about 23¾ tons of coal are carbonized. This is nearly 4 tons, or about 70 per cent. more, per man per day, representing a saving of 41 per cent. on labour with the Coze, as compared with the ordinary settings.

The condensers are of the atmospheric type as commonly used in Germany. They consist of a very large sheet-iron cylinder, through which pass vertical tubes for the circulation of air. When it is necessary to increase their cooling action, these condensers are sprinkled with water. They are placed in a house. The exhausters are of the Beale pattern. The tar is removed by means of Fleischauer tar-extractors, and there are also two recently added Pelouze and Audouin extractors. The gas is subsequently washed in towers, packed for two-thirds of their height with perforated plates, and for the remaining third (at the top and outlet end) with wooden laths. The washing of the gas is completed, and the last traces of ammonia removed, in a "Standard" washer. Purification is carried out by means of bog oxide, and without the use of any lime. The purifiers do not call for comment. A layer of oil is maintained on the water in the lutes, with the object of preventing the lids and sides of the vessels being attacked at the water level. A small fan, attached to an ordinary meter, is used to drive 1·5 to 2 per cent. of air (by volume) into the gas as it enters the purifiers; and the effect of this procedure on the illuminating power and calorific value of the gas has to be borne in mind. The admission of the air considerably extends the period of activity of the purifiers.

After it leaves the station-meters, and before it enters the gasholders, the gas is carburetted by means of a Munich steam carburetting apparatus. As the quantity of gas made is practically constant throughout the day, the cock of the carburettor is regulated so that the amount of benzol introduced into the gas is equal to about 10 oz. per 1000 cubic feet. The storage accommodation is small. There are two telescopic gasholders, holding 141,000 and 212,000 cubic feet respectively. For the supply of some outlying districts, there is one gasholder, of 17,650 cubic feet capacity, 1¼ miles from the works, and another, of 39,000 cubic feet capacity, about 3 miles distant. The gas is pumped into these by an exhauster. As the main is small, the outgoing gas is regularly carburetted with xylene, so as to avoid naphthalene obstructions in cold weather. The gasholders are not enclosed in houses, as is usual in Germany; but the water in the cups is prevented freezing by the circulation of steam. The gas leaves the works through two governors of special pattern—that for the higher districts being regulated to 12-10ths pressure, and that for the lower districts to 5·1 inches.

The water-gas plant comprises a Dellwik-Fleischer generator, which is supplied with the works' coke, and has a productive capacity of 10,600 cubic feet of water gas per hour; a blower (made by Jaeger, of Leipsic), to give a blast of any pressure up to 118 inches of water; and a boiler, which supplies steam for the production of the gas and for driving both the blower and the exhauster which forces the gas into the retorts. The steam for gas making is at a pressure of 71 lbs. A scrubber and the necessary valves complete the installation. The water gas is measured by a station meter, and stored in a relief gasholder of 7000 cubic feet capacity, from which the exhauster draws it and forces it into the retorts. This exhauster is not a necessity; it was one belonging to the works, and being available was used to compensate for the small diameter of the main which leads the water gas to the retorts. One man in the day time, and another at night, manage the generator; another man attends to the boiler and blower, and supplies the coke to the generator.

The manipulation of the plant is very simple. A lighted jet of the water gas serves for controlling the working of the plant. When the flame becomes short, and makes no noise in burning, the generator is getting cold. The steam is then shut off, the valve at the top of the generator is opened, and the same action releases a bolt which controls the air-valve. The valve communicating with the open air is shut, and the blast valve is opened. The air comes on to the mass of incandescent coke at a pressure of 23½ inches of water, and the products of combustion escape at the outlet of the generator with a pressure of 8 inches. The duration of the "blow" is not fixed. When the workman sees the gas light at the outlet burning with a pretty purple flame, he knows that the air is only being converted into carbonic oxide, and he then stops the inflow of air, and opens the valve which puts the blast-main in communication with the open air. He is then at liberty to close the generator. The steam-tap is next opened, and gas making proceeds until the flame of the controlling jet becomes bad.

Steam is admitted at the bottom of the generator for two "runs," and then for one "run" at the top, in order to equalize the temperature of the bed of coke. The "blow" never lasts for more than one minute; while the run lasts 7 or 8 minutes. The valves are self-locking, in order to prevent the workman carrying out the operations in any other order than the right and safe one. During the "blows" and "runs," the workman devotes himself entirely to observing the appearance of the controlling flame. Every morning, the "blow" is stopped for about an hour, and clinkering is done through the bottom doors.

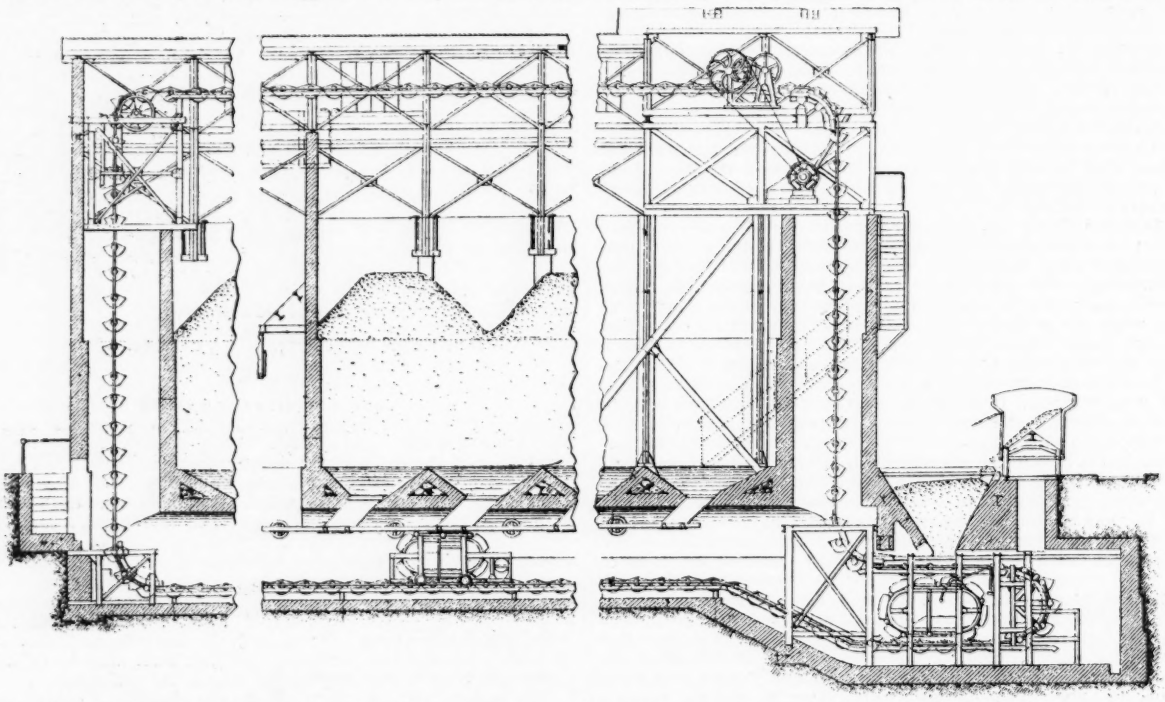
(*To be continued.*)

COAL-CONVEYING PLANT ON THE CONTINENT.

At the Meeting of the Société Technique last week, M. Richard brought under the notice of the members various installations of plant for the transport of coal on the Continent. He explained that he had selected his examples with the view of showing how the same object could be attained, with almost identical advantages, by employing, according to the necessities of the case, appliances of very different characters, or even by combining some of the best features of each. He had chosen for notice the plant at the gas-works at Bremen, Zurich, Brussels (St. Gilles), Mayence, Berlin (Gitschiner Strasse station), and Nancy, as well as that put up at the central generating station in connection with the electric tramways at Lille.

The gas-works at Bremen being entirely new, facilities were afforded for the employment of modern appliances; and these were introduced for dealing with both the coal and coke. The former is removed from the vessels by means of two American elevators on the Hunt system, having a capacity of 30 to 50 tons per hour. They consist of a movable colonnade, or framework, carrying an inclined iron arm, upon which runs a carriage furnished with a coal-skip. A single cable, worked by an electric winch, enables the skip to be moved up to the inclined arm, and then run down until it is in a position to automatically empty itself into the hopper. The coal thus discharged falls into waggons holding 15 tons, which on being drawn into the coal-store are cleared of their contents by the opening of the sides. The coal is taken out of the store in waggons moved by hand, thrown into the breakers, and then raised by bucket chains and passed into the charge-measurers for the inclined retorts. The arrangement is similar to that in use at the Vaise (Lyons) Gas-Works, which was described by M. Godinet at the meeting of the Society last year. The coke coming from the retorts is quenched upon a horizontal grating, and then shot into a hopper opening into the yard. A Hunt discharger about 300 feet long, placed transversely over the yard, enables the entire area to be covered, as it moves upon rails about 450 feet in length. Upon it runs an electrically worked carriage, to which may be attached a skip for collecting the coke from the outlets of the hoppers and conveying it to the stack. The capacity of the discharger is from 20 to 40 metric tons per hour, according to the distance to be traversed; and only one mechanic is required to attend to it.

The coal-conveying machinery in use at the new works of the Zurich Municipality at Schlieren, as well as that at Nancy, has already been fully described in the "JOURNAL"—the latter as recently as Nov. 18 last—and therefore does not call for further notice. At the St. Gilles works, in Brussels, the installation is almost identical with that in use at Zurich. For the discharge of 50 tons per hour, four men are required—two in the boat, to guide the skip, one at the elevator, and another to look after the automatic lines and the boiler by which the winch is actuated. The coal-stores at Mayence are about 1000 feet long and 65 feet wide, and they will eventually be filled either by water carriage or from the railway. At either end are two Hunt travelling elevators furnished with skips. At present the coal arrives by rail, and only the truck elevators have been installed. The distribution of the coal in the store is done by trolleys, which discharge their contents by the opening of the sides. Particulars have been



given in the "JOURNAL" for Feb. 25, 1902, in regard to retort-house working at the Gitschiner Strasse station of the Imperial Continental Gas Association in Berlin. It will therefore suffice to say here that all the coal arrives in boats of about 200 tons capacity, and is raised by a Hunt elevator and deposited in a feeder, whence it falls into trolleys running on rails laid upon a viaduct. No difficulty arose in carrying out the installations here briefly described, as the works were new. This, however, was not the case at Nancy, where the coal-stores were irregularly placed, and consequently necessitated a method of distribution of the raw material which gave some trouble.

The very interesting installation of machinery for filling and drawing upon the coal-stores at the central generating station of the Lille tramways was considered by M. Richard to merit the attention of the members of the Society, seeing that it could equally well be employed in gas-works—in fact, an identical arrangement is in use at Amsterdam. He therefore concluded his paper with a description of it. The general arrangement is shown in the accompanying illustration. The coal arrives by canal, and is loaded into waggons at a point about 500 yards from the station. The waggons are moved electrically, and they discharge into an underground hopper, beneath which passes an endless chain, furnished with tipping buckets, travelling in a closed channel. When the buckets are full of coal, they move along the channel, then rise, and proceed in a horizontal direction until they reach the required spot, where a clutch causes them to tip. The stock of coal is drawn upon by means of a movable filler, mounted upon wheels. It is brought under the pit which it is desired to empty, and coal is run into it through sliding doors. The full buckets always move in the same direction; but instead of tipping above the pits, they tip over two elevated hoppers, large enough to contain sufficient coal for a day's work. From these hoppers the coal is elevated by suspended single-rail trolleys, the purpose of which is to check and weigh the charges employed by the stokers. With this object, the suspended rail passes over a weighbridge placed at the entrance to the boiler-house. Ashes are also removed by single-rail trolleys.

The three operations above described cannot, of course, be performed simultaneously, but only in succession. However, the capacity of the appliance, which is 30 tons per hour, allows of their being easily performed. The size of the buckets is 2 feet square and 14½ inches deep; and the capacity of the pits is 600 tons. The speed of the chain is 40 feet per minute; and it is actuated by an electric motor of 12-horse power. The entire appliance can be worked by one man, who looks after the filling of the buckets and the arrangement for tipping them. It possesses the advantage of performing the two important operations of adding coal to, and taking it from, the store; it is stated to be reliable in working; its maintenance entails but trifling expense; and it is equally applicable to small as well as to large quantities of material.

Mr. Neill M. Barron, Assistant to Mr. Deas, the Water Engineer to the Warrington Corporation, has been appointed Resident Engineer at the new water-works which are being carried out at Wingham for the supply of Margate.

TESTING THE STRENGTH OF MANTLES.

The above subject was brought under the notice of the members of the Société Technique du Gaz en France, at their meeting last week, by M. Syssoyeff, who described an appliance for measuring the strength of gas-mantles. The following is an abstract of his paper.

The author began by pointing out that progress in the manufacture of mantles has been in the directions of luminous efficiency, external form, and constant radiation. As regards their resistance to wear and tear, the present mantles are no better than those made ten or twelve years ago. The absence of any means of quantitatively expressing the resistant quality of the mantle has been one cause of the slow progress. Another, no doubt, has been the theoretical objection involved in the law of the emission of light from an incandescent body, which lays down that it is directly proportional to the surface of the latter, and inversely proportional to its weight—that is to say, the shorter and heavier we make our mantles, the more we lose in luminous radiation. Hence those who have attempted to impart greater strength to mantles have discarded any increase in the weight of the mantle as impracticable, and have followed other methods, such as the introduction of foreign substances into the mantle, and the employment of different means of construction. None of the attempts, however, produced a mantle of much greater strength than those already existing. Indeed, the most distinct steps in improving mantles were taken in 1893-4, at which time a marked advance was made as regards strength and ensuring very slight loss of luminosity after continued use.

In the course of experiments made with the view of producing a strong mantle, a simple instrument was devised wherewith to express in figures the comparative strength of various mantles. It consists of an upright rod fixed in a heavy foot, and having a short arm projecting from its upper end. The mantle is suspended from a hook at the extremity of this arm, and its base is secured to a flat plate by the simple means of coating the plate with wax, and bringing it, with the wax melted, into contact with the base of the mantle. From the plate thus fixed underneath the mantle a balance-pan can be suspended, and weights to any desired extent laid upon it. A support is provided for the pan, so that no shock is occasioned by the act of changing the weights. The method of testing is to gradually increase the load until the mantle breaks. By means of the apparatus, it was found that most mantles break under the load of the pan alone, the weight of which is only 5 grammes (77 grains). Better brands withstand a total load rather under 20 grammes. The mantles obtained by the methods already described require a weight of from 30 to 35 grammes before they break. This was an improvement; but it was not considered sufficient to constitute a distinct advance. Now, however, after three years' research, mantles can be manufactured of such strength that their breaking load is 120 grammes ($4\frac{1}{4}$ oz.) and upwards—a degree of resistance which the author considered justifies his use of the word "unbreakable." The lighting power has not suffered by this increment of strength. Photometric measurements show that the luminosity equals that of Auer mantles, and the lighting power, instead of falling off, increases by about 15 candles during the first 100 hours' use.

The method by which mantles of this great strength are prepared is similar in principle to the process well known in pottery, in which fine powder from waste calcined articles is mixed with the clay; and the shrinkage which takes place on firing is greatly reduced by this addition. To the solution of thorium and cerium salts there is added a suitable proportion of fragments of disused mantles, with the following results: (1) The mantles support a load weight of 120 grammes; (2) shrinkage and warping are prevented, and the original shape is retained; (3) the luminous emission is constant, alterations being due only to the distortion and contraction of the mantle. The weight of the mantle is about 150 grammes; that of an ordinary mantle, about 50 or 60 grammes. The surfaces in the two cases are equal in area. According to the law of emission from incandescent bodies, one would quite expect that the mantle produced in accordance with the process described should emit only about one-third of the usual light; but, as a matter of fact, it is the same in each case. The explanation of the paradox is that the porosity of the mantle is increased by the addition of the fine fragments of mantles; thereby actually producing a greater surface from which radiation can take place.

On the practical side of the question, the author was not prepared with a satisfactory explanation of the reason for there being a direct relation between the maximum breaking load and the wearing properties of the mantle. Objections have been raised to the argument that of two mantles supporting respectively 120 and 20 grammes, the first will outwear six of the second. But, in point of fact, during the fifteen months that the mantles have been in ordinary use, practical tests have, the author said, proved the correctness of the relation. For indoor lighting, whether in ordinary apartments or in public establishments, the life of the mantle is directly proportional to the weight it will support, always excepting the rare case in which the mantle is broken in changing the chimney or in some other way. With regard to outdoor lighting, the author could only speak from experimental data; but he said there seemed to be no reason why the use of mantles on a large scale should not bear out the proportion. It is known that good mantles, such as those of the Auer type, harden under the prolonged action of the flame, but that their life is influenced more by external causes, vibration, &c. When ignited, the mantles are less sensitive to these influences than when cold, as they assume an elastic condition when incandescent. Wear and tear, therefore, takes place during the periods of disuse—*i.e.*, in the cold; and for this reason, evidently, the life of the mantle must mainly depend on its strength at normal temperatures.

USE OF COKE FOR GAS-PRODUCERS.

In a note issued by the Société Technique du Gaz en France last year, they asked for particulars of new industrial uses of coke. In response, M. Pierson submitted to the meeting of the Society last week a short paper on the employment of coke for gas-producers working by suction. Producers of this description are already widely adopted abroad, especially in Germany; and they are coming into use in France. In England, on the other hand, their development has not been so great, in consequence of the extremely low price at which gas is sold. The first patent for a producer of this kind was taken out in France in 1860, by M. Arbos; and up to the present time the apparatus could only be worked with anthracite of high grade, containing very little volatile matter or ash. The problem has been to feed it with small coke. It is well known that coke from gas-works frequently leaves a fusible ash that forms a crust of clinker, which, attaching itself to the walls of the furnace, chokes the air passage. The author claims to have fully succeeded in avoiding this fusion of the ash and deposition of clinker. The latter is certainly greater in proportion than with anthracite; but as the small coke can be had anywhere, at trifling cost, it would seem that gas-works will find the producer a convenient mode of making use of it. Its adoption would only tend to raise the price of this class of coke. Suction gas-producers are likely to find extensive application in places where oil gas is unsuitable. Indicator diagrams, taken on a motor of 25-horse power fed with gas from a Pierson producer, and using small coke, show that the variations in pressure are very slight, that the gas is supplied with great regularity, and that the consumption of material does not much exceed $1\frac{1}{2}$ lbs. per horse-power-hour, and in certain motors may fall below this amount.

PROGRESS IN THE GAS INDUSTRY.

From an American Standpoint.

Although it came first in the survey which Mr. Irvin Butterworth made to the Ohio Gaslight Association of the progress in the technical work of the gas industry in the last five years, we have left to the end the section dealing with the improvement made in appliances—industrial, domestic, and lighting generally—until the end. From it the following extracts are now taken:—

Gas-Engines.

Undoubtedly the greatest progress that has been made in the gas business during the past five years has been in the direction of the development and use of the gas-engine. When using coal gas, the best modern large gas-engines will consume only about 15 feet of gas per hour per horse-power, as against about 20 feet five years ago; while, when using producer gas, a horse-power per hour can now be obtained from 1 lb. of coal, or less than one-half the quantity employed by the best steam-engines, and as high as 34 per cent. of the theoretical heat value of the fuel can now be transmitted as power to the engine-shaft. The regulation of gas-engines has been improved to such a degree that a cyclic variation of $\frac{1}{3\frac{1}{2}\frac{1}{0}}$ is now obtainable, easily permitting the operation by them of alternating current generators of medium frequency in parallel—something that has not heretofore been possible. This has been accomplished: (1) By varying the quantity of the explosive mixture in proportion to the changes of load without changing its strength per unit volume, and without decreasing the number of charges per unit of time, instead of, as heretofore, simply varying the number of explosions in proportion to the changes of load; and (2) By substituting for the old-fashioned single-acting cylinder two or three, or even more cylinders, set eccentric, then making the cylinders double-acting, so that the engine-shaft now receives much more frequent impulses than formerly.

Electric igniters have been substituted for the hot-air tube, permitting more exact and economical timing of the ignition. Compressed air is now used for starting the engines, removing a former difficulty, and large gas-engines are now being built for lean gases such as producer and blast-furnace gases. Their dependableness has been increased to such a degree that recently a 150-horse power gas-engine was operated at nearly full load, night and day, for 138 days without once stopping. According to our last census, the number of gas-engines in use in the United States in 1900 was 14,884, although this return is probably

far from complete; while, according to the same authority, the aggregate horse-power of these engines was 143,850, being 1500 per cent. more than in 1890—this being the largest increase shown in the use of any prime mover. But the most astonishing increase has been in the size of the engines. In 1893 visitors at the World's Columbian Exposition in Chicago were impressed with the 35-horse power gas-engine there exhibited. At the World's Fair in Paris, in 1900, a 1000-horse power gas-engine seemed a monster; but within the past two years sizes have been increased to as high as 4000-horse power, and the British Westinghouse Company are now building at Manchester 15,000-horse power two-cylinder gas-engines.*

America seems to be lagging behind Europe in the matter of the number of large gas-engines in use; only 25 per cent. being placed to our credit, although we have built as large as any that are in use thus far (4000-horse power), and one American firm has recently taken contracts to build 16 gas-engines of 2000-horse power each. In Europe, the use of large gas-engines with producer gas for operating factories has increased enormously within the past two years; one firm having made 32 engines averaging 1390-horse power, none of them less than 200-horse power. The present tendency is towards the horizontal type of engine; but Mr. Herbert A. Humphrey, who is a student of this subject, predicts that the vertical type will finally prevail, especially for central station work. Although most of these large engines are used (as stated) with producer gas, yet 280-horse power gas-engines are used in this country with ordinary illuminating gas. Mr. Humphrey says: "The recent remarkable progress in large gas-engines will undoubtedly continue until Sir Frederick Bramwell's prophecy of 21 years ago has been fulfilled, and steam-engines will only be found in museums."

Gas Ranges.

I have no statistics showing the increase in the use of gas-ranges during the past five years; but it is a matter of common knowledge that their use is increasing enormously. I estimate that there are now about 1,500,000 gas-ranges in use in the United States. This is on the basis of 1 to every 20 inhabitants in the cities and towns supplied with gas.

While no one improvement of a radical nature has been made in gas-range construction during the past five years, yet many minor improvements have been made that have greatly increased their efficiency, durability, adaptability, appearance, and convenience. Progress has also been made in large baking-ovens, especially as to their capacity; one having recently been installed in Boston that is 18 feet long, 11 ft. 3 in. wide and 5 feet deep, having a capacity for baking 32,000 1-lb. loaves of bread per 24 hours at an estimated cost for gas of 0·1 c. per loaf.

Gas-Heaters.

There have been, during the past five years, no improvements in portable artificial gas-heaters worth mentioning; essentially the same types and designs having been used throughout the period. There have been some improvements in natural-gas heaters; but as they contemplate the use of large quantities of cheap gas, they need not be considered here. Several years ago one enterprising firm brought out a large hot-air gas-furnace for heating entire houses from the cellar; but as it cost about two-and-a-half times as much to heat a house with it as to heat it with coal, notwithstanding it is said to utilize 80 per cent. of the heat units of the gas, its use has not become extensive. The same firm has since "gotten" out a large water-heater adapted to house heating which is said to give good results. In Milwaukee, Mr. Walker has devised and put into use a gas-furnace for heating houses with hot water that serves the purpose very satisfactorily during cool fall and spring weather, and that should have even a greater field in more southern cities.

Independent Water-Heaters.

Considerable improvement has been made in the construction of water-heaters during the past five years, resulting in a great increase in their efficiency and general satisfactoriness. The water-heater attachment to gas-ranges of former times, which was very uneconomical, has given way entirely to the independent heater; and these are now made lighter in weight, with thin and contracted water-passages—rendering them very efficient and practically instantaneous. Illustrating the improvement that has been made in them, one firm reports that the heater they formerly made required 83 minutes to do the work that their present heater accomplishes under similar conditions in 40 minutes. Five years ago, water-heaters were constructed with tight casings and burners, so that, in order to get at the coil or burner, it was necessary to disconnect the heater from the boiler. Now they are so constructed that the entire casing can be easily and quickly removed for the cleaning or repairing of the coils and burners without disconnecting either the water or the gas connections. Some manufacturers are avoiding the leakages and stoppages due to a multiplicity of small water-pipes and numerous joints by using, instead, cast-iron sections of various forms placed one above another; and one is employing a spiral form of water chamber for accomplishing the same purpose. In fact, there is at present great activity in invention looking to the improvement of water-heaters; and one firm boasts a flue-gas temperature of only 240°, indicating, under proper conditions, a high efficiency.

* This is an error, due to the use of one too many ciphers in the authority consulted; the engines referred to are only 1500-horse power.

Instantaneous Water-Heaters.

There has been some progress made in the development of instantaneous water-heaters, chiefly in making them of different sizes for different purposes; and in so constructing them that the water comes in actual contact with the products of combustion, increasing their efficiency to the extent that the water absorbs as high as 90 per cent. of the heat of the gas. One heater turns out 3 gallons of water per minute, raised 50° in temperature, with a consumption of from 2 to 2·5 feet of gas. But the use of these heaters seems to be as yet somewhat limited, possibly partly on account of their necessarily high price. The independent water-heater business seems to be growing much more rapidly. A concern employing 100 men now turns out, according to their own statement, the bulk of the instantaneous water-heaters that are used in this country; but as they employed only from 10 to 20 men four years ago, the growth of their business is evidently very considerable.

Industrial Fuel-Gas Appliances.

Much progress has been made during the past five years in devising and perfecting numerous fuel-gas appliances for industrial purposes, and in developing the use of same. But the limits of this report preclude an enumeration of them in detail. The Milwaukee Gas Company have probably done more in this direction than any other company in the country. They are now able, for instance, to melt brass cheaper with gas than with coal, and have devised furnaces for the purpose that consume as much as 420 feet of gas per hour. The progress that has been made in the use of gas for fuel purposes is well shown in the fact that many gas companies in this country are now selling, during the year, quite as much gas for fuel as for illuminating purposes.

Welsbach Burners.

There have been no radical improvements in the Welsbach burner itself; but many minor ones, such as: (1) Improvement in the adjustable check originally brought out in 1897. (2) The invention of a new check by which a needle-valve is operated by means of a milled screw-head at the side of the burner base. A ball-check burner has also recently been put upon the market. (3) The strengthening of the gallery. (4) The shortening of the Bunsen tube, improving the appearance of the burner. (5) The devising of a single burner that is adapted to any standard mantle, any kind of gas-fixture, any design of glassware, any pressure of gas, and for use, if desired, with open-flame gas globes. (6) The designing of porch burners capable of withstanding draughts. There has also been devised a ball-joint that makes the fixtures always hang plumb. Improvements have also been made in anti-vibrator attachments and in pilot lights; the newest pilot light being said to consume less than 1 foot of gas per 24 hours.

Incandescent Gas-Mantles.

While there have been some improvements in the manufacture of gas-mantles during the five years, none of them have been of a radical or important nature, except, possibly, the carrier or cap attachment invented several years ago, and now so perfected that any consumer, however unskilful, can easily place and adjust his mantle on his burner, and which also protects the mantle from breakage in shipment and handling. One manufacturer makes a central support for mantles, claimed to conduce to their longevity; another has adopted a new stitch that is claimed to do the same thing. The larger manufacturers are turning out mantles much more uniform in quality than formerly; and the greenish cast of light originally emitted by them has been overcome—the light now being of a pleasing quality, The best mantles now give a light of about 21 or 22 candles per foot of gas at ordinary pressure, which shows no perceptible improvement in this respect during the period under consideration. Mantles are now made in much larger variety than formerly for a greater variety of purposes; the latest catalogue of one manufacturer displaying 26 different kinds of mantles. The price of good mantles has not been materially cheapened in this country; but their use has increased enormously, at the rate, according to one authority, of 3 millions per year during the past five years, until now it is estimated that 30 millions per year are manufactured and used in this country.

"Arc" Gas-Lamps.

There have been great improvements in incandescent gas-burners, particularly in the recent development of the so-called "arc" gas-lamps and in the still more recent high-pressure and self-intensifying gas-lamps. Of the former, there are said to have been 130,000 manufactured and put into use by one firm alone in this country during the past two or three years. In fact, the development of the "arc" gas-lamp is considered by many gas men to be the most important step in the progress of the gas business during the past three or four years. By this means alone, the gas companies in some cities have virtually been able to maintain their prosperity. When first made, about four years ago, these lamps were simply two, four, or more ordinary Welsbach burners grouped under one shade, or in one globe, but separated quite a distance apart on short arms of a pendant. Now they are clustered compactly together, so that the mantles

are in close proximity to each other, thereby emitting a light that justifies their name of "arc." They are now so made that all of the burners, or all but one of them, as may be desired, can be turned off by a bye-pass arrangement. Their appearance and design have been greatly improved during the past year or two, and a large number of firms are now engaged in their manufacture; the advertisements of not less than fifteen appearing in the technical journals of this country. Means for lighting these lamps by electricity have been so improved that this system of illuminating large stores is perfectly satisfactory. As originally constructed, it was a difficult matter to clean and repair these lamps. Now no chimneys are employed in the ordinary construction; and the mantles can be renewed and the globe cleaned without removing it.

Self-Intensifying and High-Pressure Lamps.

Although these lamps have not as yet cut much of a figure commercially, yet their possibilities, or rather their probabilities, are so great that their development (which has all been within the past few years) is a matter of great interest and importance to us. Their chief development thus far has been in England, where high-pressure lamps, using Welsbach burners, and consuming gas at high pressure, are being used to some extent for street lighting and other purposes. At the outset, this high-pressure gas was produced by means outside the lamp itself; but now lamps are being so made—as in the case of the Scott-Snell lamp—as to utilize the heat of the products of combustion for this purpose. The means for doing this are as yet cumbersome and noisy, consisting virtually of a miniature hot-air engine, militating against the rapid introduction of the lamps; but as the efficiency of the lamps under proper conditions is as high as 50 candles per foot of gas, inventive genius and industry, which are now very active along these lines, will probably soon bring them to a commercial success. A considerable number of these lamps are in use in New York and other cities of this country.

There is also a type of lamp, such as the Lucas, which is made self-intensifying by means of an extremely long chimney, in some cases 4 feet long, which increases the draught, and thereby intensifies the heat of the flame. These lamps are being vigorously and industriously experimented with; and doubtless a commercial article will ultimately be evolved from them. At present, they are quite unsightly. There is also at present a revival of former efforts to perfect devices for mechanically mixing gas and air, in known and exact proportions, before bringing the mixture to the burners, thereby greatly increasing the light per cubic foot of gas consumed.

That during the past five years gas-lamps have come into use that have increased the light-giving duty of a foot of gas from (say) 20 candles to 50 candles, is a most significant and inspiring fact in its bearing upon the future of the gas business.

Incandescent Gas Street-Lighting.

Incandescent gas street-lighting has made great progress during the past five years, especially during the early part of this period; and it is still coming more and more into favour, gradually making headway against electric street-lighting, and regaining to gas much of this business that it had previously lost. Berlin, with its 32,000 Welsbach street-lights, is now said to be the best lighted city in Europe. The growth of this system of street-lighting is shown in the fact that in Boston and its vicinity there are in use about 15,000 incandescent street-lamps; in Greater New York and its vicinity 20,000; in St. Louis, 13,000; in San Francisco, 5000, &c. Nearly all of the smaller cities and towns of the country have many of them in use. The city of Liverpool owns an electric light plant, and buys what gas it uses from a private company; and yet the Chairman of its Lighting Committee, replying to a question asked in open Council, recently said that the Committee did not intend to extend electric lighting in the streets, as they had found that incandescent gas was quite as good, and much cheaper.

The improvements in the lamps themselves during the past five years consist chiefly in the adoption of a more symmetrical and ornamental boulevard lamp, with only two uprights; thus minimizing shadows, and having an iridescent dome that tends to reflect the light down upon the street, and improved ventilating arrangements, rendering the lamp wind, dust, and insect proof. More of the bottom of the lamp is now being made of glass, lessening the shadows in the vicinity of the post. The burner itself has also been improved, as well as the pilot-light arrangement. A clockwork device has also been invented for automatically turning out each lamp at any desired time.

Self-Lighting and Electric Gas Lighting-Devices.

There have been no noteworthy improvements in these devices, although some progress has been made. Chemical self-lighters, such as the platinum sponge pellet, have not proved commercially successful. Successful installations of electric gas-lighting attachments for large stores and for single lights are, of course, in use in considerable number; but, on account of their relative expensiveness, unsightliness, and unreliability, people who want self-lighting lights generally use electricity.

Gas Globes.

Five years ago holophane globes were looked upon more or less as a scientific curiosity, the advantages and utility of which were not at first apparent to the average gas man. A leading gas journal at that time published the following prediction with reference to them: "Some day the public will awake to their real value and wonder at their long delay in doing so." This prediction has been verified, for we see them by thousands in every city; the finest gas-lighting effects being produced by them. The monthly sales of holophane globes in this country are now said to be ten times what they were three years ago. The last catalogue of the Holophane Company illustrates 56 different designs of globes, embracing 95 different sizes, of which only a dozen were made five years ago.

The improvements have been as follows: (1) The weight of the glass and its liability to crack have been reduced. (2) The maximum size of the globes has been increased to 20 inches in diameter. (3) Rose glass shades are being successfully made for use with Welsbach burners, changing the harsh, white light to a pleasing colour. (4) The globes have been made more refractory and more uniform in their results.

Gas-Fixtures.

Some of the eastern fixture manufacturers have recently taken up the manufacture of high-class fixtures that are better than imported ones, including specialities in the way of single fixtures of intricate and elaborate design, on a scale not attempted in this country five years ago.

Lava Tips.

Even lava tips are being gradually improved along the lines of greater accuracy and uniformity.

This concludes Mr. Butterworth's summary, which, he says, indicates that recent progress in the gas business has been chiefly along the following lines: Gas-engines, "arc" gas-lamps, uses of gas for fuel, producer gas, low candle-power gas, high-pressure distribution, and bye-product coke-ovens. He also acknowledges by name those who assisted him in the collection of the data for the report.

GERMAN PROGRESS IN THE RECOVERY OF CYANOGEN.

(*Continued from p.* 295.)

Dr. Bueb, after dealing with Herr Feld's proposals for the extraction of cyanogen from coal gas, as already reported, proceeds to discuss the communication of Dr. Nauss, of which the substance has been reproduced in the course of this series of articles (*ante*, pp. 29 and 156). Dr. Bueb remarks that the observations of Dr. Nauss on the formation of sulphocyanide are very interesting, and are supported by the fact that in practice the ammoniacal liquor from the "Standard" washers contains only very small amounts of sulphocyanide. Dr. Nauss might with advantage extend his observations to the water-cooled condensers, and determine the loss of cyanogen in them.

The figures given by Dr. Nauss for the returns which may be expected from the various processes of cyanogen recovery are based only on theoretical considerations, and have very little practical significance. Dr. Bueb points out that a ferrocyanide solution, obtained directly from gas by means of an alkaline solution of ferrous iron, will not have a higher value than the ferrocyanide in the insoluble double salt of ammonia, because of the impurities always present in it. It is very difficult to work up pure ferrocyanide from such an impure solution. The hydrated ferrous oxide required for the production of this soluble ferrocyanide compound must be produced on the gas-works without access of air; and the requisite manipulation to achieve this would not fall within the compass of gas-works practice. Dr. Nauss assumes in his calculations on the Bueb process that the ammonia which exists in the cyanogen sludge in the forms of cyanide and sulphate must be handed over *gratis* to the contractor for the sludge, though it amounts to from one-half to one-third of the total quantity of ammonia produced; while for the volatile ammonia only, would a price of 1·95d. per pound be obtained. In reference to this assumption, Dr. Bueb says that in practice the ammonia taken up in the cyanogen sludge amounts at the most to one-third of the ammonia produced, and is generally very much less. At the Warsaw Gas-Works, only 24·06 per cent. of the ammonia produced in 1902 went into the cyanogen sludge.

Dr. Bueb next points out that when the question of the introduction of a new process—such as cyanogen recovery—at a gas-works is being discussed, negotiations will be undertaken to ascertain what price can be obtained for the product under the particular local conditions. This has been the procedure in the case of the gas-works which have already adopted the Bueb process of cyanogen recovery; and the decision to take it up has been made only after it has been ascertained that it will be industrially profitable. Small gas-works often prefer to keep no special account for the ammonia, but to merge its value in a higher price paid for the cyanogen. The German Continental Gas Company dispose of their cyanogen sludge at prices for both the cyanogen and the whole of the ammonia in the sludge, which are fixed according to a sliding scale based on the prevailing

market prices of potassium ferrocyanide and sulphate of ammonia. Even the smallest gas-works can count on receiving about 4d. per pound for the ammonia, which price is rarely obtained even for the ammonia in concentrated gas liquor. With the latter the cost of concentration has to be deducted from the price received for the ammonia.

In a subsequent number of the "Journal für Gasbeleuchtung," Mr. E. Drory tells his experiences of the Bueb process of cyanogen recovery at the Mariendorf Gas-Works, Berlin. The practical results of the working of the process on a large scale which he gives form a valuable supplement to what has already been reported with reference to it. He treats the subject under three headings: (1) The reasons why the Bueb process was introduced at Mariendorf; (2) the disposition of the apparatus; (3) the working results.

The Chemist of the Imperial Continental Gas Association, Herr van Eyndhoven, had made numerous analyses, which showed that, apart from the ammonia washers, very considerable loss of cyanogen was associated with oxide purification. It was found that at all the Association's works at Berlin new oxide absorbed the cyanogen in the gas almost completely, but that highly charged oxide allowed upwards of 80 per cent. of the cyanogen to pass. Cyanogen, if not removed from coal gas, causes injury to governors, gasholders, and, in particular, meters. This had been fully experienced at the large meter-repairing shop of the Association at Berlin. It was hoped, therefore, that the Bueb process would not only largely increase the amount of cyanogen recovered, but would also reduce to a minimum the evils arising from the presence of cyanogen in the purified gas. It was not anticipated that there would be any considerable loss by reason of the ammonia in the cyanogen sludge, because the ammonia works were at a considerable distance from all the gas-works, and all the advantages which accrue from working up the liquor in close proximity to the gas-works were lost.

The train of apparatus was the customary one, except that separate washers were provided for cyanogen and naphthalene extraction, so that any interruption with one would not throw the other out of action also. The set of apparatus therefore comprised: An exhauster of a capacity of 2,100,000 cubic feet per 24 hours, a Drory tar-extractor of the same capacity, a "Standard" washer, with three double chambers, for naphthalene extraction, a "Standard" washer, with three double chambers, for cyanogen extraction, two Reutter condensers, having each a cooling surface of 2810 square feet, and a "Standard" washer, with five double chambers, for ammonia extraction. The Reutter condensers were sprinkled continuously with weak gas liquor. The whole of the liquor condensed between the retorts and the exhauster, apart from that needed for the tar-extractor, was re-introduced into the system at the Reutter condensers. Only clean water was run into the "Standard" ammonia washer. The cyanogen sludge was not worked up, but disposed of as such.

The more interesting particulars of the actual working of the Bueb process at the Mariendorf Gas-Works may now be given. The total yield of cyanogen was practically the same whether it was English or Silesian coal which was carbonized. In the first eleven months of 1902, there were obtained 3·56 oz. of prussian blue (= 5¼ oz. of potassium ferrocyanide) per 1000 cubic feet of gas. Analyses made at the inlet and outlet of the cyanogen washer showed that, under the most unfavourable conditions, when the first chamber was about to be discharged, 96 per cent. of the cyanogen in the gas was absorbed in the washer. Consequently, the gas would be virtually free from cyanogen after it had passed through the purifiers.

As all the gas liquor has to be transferred from the Berlin Gas-Works to a liquor works, a tolerably accurate conception of the quantity of ammonia actually produced can be formed. The average production of ammonia has thus been found to be 0·2 per cent. of the weight of coal carbonized. Taking this figure for the Mariendorf works, 28·1 per cent. of the total amount of ammonia produced at the works was found in the cyanogen sludge. The amounts of both volatile and fixed ammonia in the sludge were constantly checked by concordant sets of analyses made for the gas-works and for the buyers of the sludge. There were some grounds for anticipating that the sulphuretted hydrogen which was combined with the ammonia would be liberated when the latter was absorbed in the cyanogen washer, and so would pass on to the purifiers. But analyses of the gas before and after the washer showed that about 10 per cent. of the sulphuretted hydrogen passing was retained in the cyanogen sludge. The investigations on this point have not yet been completed.

The cooling of the gas which occurs in the numerous pieces of apparatus and in the exposed connections, and the absence of tar and naphthalene on the condenser surfaces, naturally give considerable relief to the condensers. For instance, 2,295,000 cubic feet of gas were cooled to 53½° Fahr. with a consumption of only 32,400 gallons of water in the condensers. The cyanogen washer, and the vigorous sprinkling of the gas in the condensers, are responsible for the removal of large quantities of ammonia, so that comparatively but little work is thrown on the special ammonia washers. For example, in 24 hours there were produced—

In the tar extractor	.	640	gallons of gas liquor of	2·1°	Twaddel.
In the condensers	.	3175	,,	,,	,,	,,	4·3°	,,
In the washer-scrubber	309	,,	,,	,,	,,	4·6°	,,

Consequently, at the present time a set of condensers and a washer-scrubber intended for 2,100,000 cubic feet of gas could deal with at least 3,200,000 cubic feet.

The cost of providing the cyanogen washer is about balanced by the relief which it affords to the condensers and the ammonia washer. The wages, on the basis of one man a day, amount in Berlin to about £75 a year. The price obtained per pound for the prussian blue in the cyanogen sludge is precisely the same as for blue in spent oxide. The whole of the ammonia, both volatile and fixed, is, of course, taken into account in valuing the sludge. Mr. Drory observes that if gas-works have overlooked the fixed ammonia when making their cyanogen agreements, as Dr. Nauss says is the case, they have only themselves to blame. The receipts per pound of ammonia fluctuate according to the English market prices; but in 1902, they were always considerably higher at the Mariendorf works than Dr. Nauss has assumed. During that year, the ammonia works, after taking all repairs and other charges into account, turned over about ¼d. more per pound of ammonia. This difference of ¼d. per pound, however, does not quite suffice to pay interest and depreciation charges on the capital laid out on the factory. The ammonia in the cyanogen sludge was thus turned to account without direct loss.

The possibility of selling cyanogen sludge, like spent oxide, at a profit, rests on the position of the market, which at the time is unfavourable enough, or on the introduction of new and better methods for the recovery of cyanogen. But, according to Mr. Drory, the chief advantage of the Bueb process, as compared with the extraction of cyanogen by means of the oxide in the purifiers, lies in the almost complete absorption of the cyanogen contained in the gas. The following incidental advantages are thereby secured: (1) Improved efficiency of the oxide in the purifiers for the extraction of sulphuretted hydrogen; (2) the possibility of using spent oxide rich in sulphur and free from cyanogen as raw material for the manufacture of sulphuric acid; and (3) the probability that numerous pieces of apparatus which formerly had been strongly attacked by the cyanogen in the gas would last longer in use. That is a gain which cannot forthwith be expressed in pounds, shillings, and pence; but it may prove quite considerable. One important consideration, in view of the ever increasing complexity of gas-works' processes, is that the Bueb method is quite simple, and can be superintended by any intelligent workman.

The practical results of the working of the Bueb cyanogen-recovery process on a large scale, which are here given from Mr. Drory's communication, would form a fitting conclusion to this series of articles. There are, however, a few points raised by Dr. Bueb and those who favour his process on which criticism has since been offered by both Herr Feld and Dr. Nauss; and we propose to devote a few words to their comments, and then close with a summary of the more important conclusions on cyanogen recovery to which the German writers quoted in these articles have led us.

(To be continued.)

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

The Future of Gas.

The last Monthly Meeting of this Association for the present session was held at the Regent Street Polytechnic on Friday, under the presidency of Mr. Walter Grafton, F.C.S. There was some general business first on the *agenda;* and after this had been disposed of in private, the members were treated to a highly interesting paper by Mr. W. Upton, of the London Office of the Buenos Ayres Gas Company. The author chose for his subject "The Future of the Gas Industry;" and he touched in a very able manner upon many of the questions which are at present agitating the minds of gas men. It is, however, impossible here to do more than notice the more striking points brought out by the author in the course of his communication.

The first matter dealt with was naturally the manufacture of gas, in connection with which Mr. Upton said he was inclined to think that the survival of the inclined retort system or horizontal retorts *plus* machinery would depend upon causes other than their immediate value as gas producers. Until recently the inclined system, with its complicated machinery attachment of breakers, elevators, conveyors, measuring and charging gear, and coke conveying and stacking apparatus, seemed to have scored one or two points over its horizontal rival; but now that the latter had adopted the same equipment, and more especially had been supplied with a well-nigh perfect means of charging and drawing, the trend of opinion appeared to be slowly changing over in favour of the horizontals. The chief claim upon which the inclined system came into being was that of the ease and rapidity of the discharge of the coke and the quickness and evenness of the insertion of the charge. In the former connection, he called the attention of the members to the fact that the erectors of a very large installation of inclines in the North had seen fit to instal a hydraulic ram gear, with a stroke of some 6 feet, to act upon the top end of the burnt-off charge, so as to get it under way and clear it rapidly from the retort.

Referring to the size of retorts, the author said it seemed somewhat strange that there had been no noticeable increase in this for a great number of years. What restricted the size in the first place to the (say) 21 in. by 16 in. for oval retorts, was probably the fact that the necessary 3 cwt. charge was the practical limit of hand charging. But if this were so, why should this size still be retained, now that they had power stoking? If a 10-foot retort could be charged with 3 cwt. by hand, it certainly would appear that some explanation was necessary of why machinery should not have improved upon this performance—more especially as generator firing had allowed of far better control of the heats than was ever possible under the old direct system of firing. He had been informed that at one of the Standard Gas Company's stations in New York they were now installing retorts capable of taking a 1-ton charge, and also that at a works in Scotland they had built an oven to take a similar charge, which was carbonized in ten hours. In the inevitable changes which would be necessary to comply with the coming demand for cheap gas, this question of the retort would have to be gone into. With the present form of D retort of (say) 21 in. by 16 in. internal cross section, the only active surface for carbonizing was the 21 inches at the bottom, upon which the layer of coal rested, and a few inches at the side. The remainder of the sides and curved top performed no carbonizing duty, but simply by their shape concentrated their radiant heat upon the nascent illuminating hydrocarbons being given off by the coal—to their destruction, and to the increase of scurf on the walls of the retort. In short, the existing retort about equally divided its available interior surface into an active carbonizer and an active breaker-up of the yield from that which was carbonized.

For the sake of comparison, suppose they took a modified D retort, but of a rectangular form, 24 in. by 10 in. This would easily hold 10 cwt. or so, and the charge would be heated from two sides and the bottom at the same time—or (say) about two-thirds of the total surface would be available for the purpose of active carbonization. The cubical space taken up in a setting by a 20-foot taper retort of from 21 in. by 16 in. to 23 in. by 16 in. internal cross section might be taken as about 89 cubic feet, and the charge as 6 cwt., or at the rate of 15 cubic feet of space taken up per hundredweight of coal carbonized; while for the 20-foot retort as sketched, of 24 in. by 10 in. rectangular form, the space required would be about 67 cubic feet for 10 cwt., or just under 7 cubic feet per hundredweight. In other words, it would more than double the output for the same cubical space occupied. With mechanical chargers, the difficulty of charging such a narrow retort would present no insurmountable difficulty; while for discharging, a ram actuated by hydraulic power (or by electric or compressed air motors) might be adopted. Under these circumstances, the inclined system would offer no advantages—seeing that the force of gravity was not depended upon to clear the burnt-off charge from the retort, and also bearing in mind the difficulty and cost of installing ram-gear high up in the roof of the retort-house.

The idea thus roughly outlined, remarked the author, bore a very close resemblance in miniature to a recovery coke-oven plant, the whole process of which was the antithesis of the prevailing practice in gas-works. Gas coke was practically a drug on the market, owing to its loose and friable character; and for this reason much speculation had taken place recently as to which of the two systems would prove the more economical for the manufacture of gas. Hitherto one of the chief drawbacks to the adoption of coke-ovens for this purpose had been the great difference existing between the summer and winter demand for gas. But when the demand at the various seasons of the year was more nearly equal, the addition of a coke-oven section to the usual plant of a gas-works might be contemplated. For the present, however, it would appear that the proper thing was to improve the quality of the coke by the adoption of larger retorts, heavier charges heated from both sides and not one side only, and regulation of the carbonizing in one section of the plant to favour the coke and in the other the gas. In support of this contention, the author cited the case of the Scotch works already referred to, where, by the adoption of a 1-ton oven, the value of the coke had been raised from 11s. to 14s. per ton.

The next point to which Mr. Upton drew attention was the value of the present-day equipment as a gas producer, or rather as a converter of solid into gaseous fuel. They were now, he said, content to transform from 15 to 17 per cent. of the weight of the raw material into gas, which, from an ordinary manufacturing point of view, was extremely poor practice. From a ton of coal, they usually obtained 17 per cent. by weight as gas, 5 per cent. as tar, 70 per cent. as coke, and 8 per cent. as liquor. In other words, there was only some 8 per cent. of the weight of the raw material which was truly a waste product in the sense of being non-convertible into gas. Pushing this idea to its extreme limits, they had to find a means of gasifying the 75 per cent. of solid residuals; and when this had been solved, they would be able to look upon their process as being near perfection. To deal with the coke, they had several good processes—for instance, the Lowe, the Dellwik, and the Loomis-Pettibone water-gas systems—while for the utilization of the tar, there was the methane-hydrogen process of Mr. C. B. Tully and Professor V. B. Lewes. Taking the latter plant for the tar and the Dellwik system for the gasification of the remaining coke, the result would be something like the following: From a ton of coal there would be got (say) 112 lbs. of tar and 1232 lbs. of disposable coke (after allowing 336 lbs. for fuel). The 112 lbs. of tar, together with 120 lbs. of coke, would give 4000 cubic feet of about 11-candle gas of 380 B. T. U.; and the remaining 1112 lbs. of coke, if employed for the production of blue water gas at the rate of 44 lbs. per 1000 cubic feet, would give about 25,000 cubic feet of gas of 300 B. T. U. Combining the 10,000 feet of 16-candle coal gas, 4000 feet of 11-candle tar gas, and 25,000 feet of blue gas, they would have some 39,000 cubic feet of mixed gases of about 5¼ candle power and from 390 to 400 B. T. U. The cost of this would be about 8d. per 1000 cubic feet delivered into the gasholder; but as the day for 5-candle gas had not yet arrived, it might be brought up to 14 candles and 500 B. T. U. by the use of oil.

The author pointed out that these figures were, of course, only an indication of what might be done. He did not, however, hesitate to assert that, it the gas industry was to keep its place and meet the demand for power, it must do better than convert only some 15 per cent. or so of the raw material into a finished article. It would also be necessary to try and obtain more accuracy in their workings. Taking carburetted water gas, for instance, by reference to the technical journals they could have results varying from 31 lbs. to 46 lbs. of fuel for the generator, and corresponding big differences in the oil results. The cause of this might be to some extent in the different quality of the coke used, whether dry or not, &c.; but usually not even the most elementary information was given on these points. The same thing occurred with the fuel for the coal-benches—one carbonized with 10 per cent. of the weight of coal, and another with 17 per cent. under approximately the same conditions. No details were given as to the character of the coal or coke used; and hence the carbonizing costs were always in a tangle.

Turning to the question of power gas, Mr. Upton said he thought that at the moment conditions seemed to trend in the direction of this business on a large scale becoming a separate industry. Spasmodic reductions made in the price of lighting gas would not meet the case. Of the tens of thousands of horse power turned out annually by the manufacturers of gas-motors, only a small proportion was for use with lighting gas; and none of the modern engines running into hundreds of horse power per cylinder were for use with anything but power gas. If they thought of the equivalent of even a modest 500-horse power gas-motor in private consumers as regarded gas consumption, and the difference in capital outlay required to serve each, the lesson of all this potential power and revenue slipping past them would be sufficient to make them very seriously overhaul their position. Unless they were prepared without further delay to take up the supply of power gas at a suitable price, they must expect to find parliamentary authority being granted to companies willing to cater for this particular line of business. The mere fact that they paid their dividends regularly year by year should not be a source of too much gratification, for they had had the lighting field practically to themselves; but if electricity generated in bulk by power-gas motors, aided by a more efficient electrical storage cell and an improved glow lamp, should happen to come along, gas men would have to put their backs into the business in earnest. At the present moment there were some eighteen Bills before Parliament for reductions in illuminating power to 14 and 13 candles; and in this connection, he pointed out that of the gas made by companies in England and Wales during 1902, 66·3 per cent. was of 16-candle power and under, while the remainder was of a higher quality. It was evident, therefore, that there was plenty of work to be done yet before what might be termed radical changes were considered.

The next question dealt with by the author was distribution. While, he said, the cost of manufacture closely accorded with the quantity of gas made, this did not quite follow in the case of the distribution department, for the standing charges and most of the wear and tear went on all the time. Looking over the last published accounts of twelve gas companies, he found that of the total of 8·85d. per 1000 cubic feet for distribution and management charges, no less than 6·62d., or about 75 per cent., was practically unaffected by the quantity of gas sent through the mains; and therefore a considerable amount of business could be done at a less cost than its arithmetical proportion to the whole. To this fact was due the extension of the slot-cooker system, &c., whereby the services were made use of during the time of minimum load. Of course, cookers were all right, and must still further be extended; but seeing that the average for London was already one to every two of the consumers, and for the country as a whole one to every three, the limits of the business would soon be reached; and however good this branch might be, he thought it was as nothing to what could be done in the supply of gas for power use. If the price of gas was made reasonable, there would be an enormous demand for power purposes—chiefly perhaps in London—for motors up to 40-horse power. And this brought him to the thorny question of what should be the charge for power. Referring to the twelve companies previously mentioned, Mr. Upton said he found that the net cost of the gas was 12·66d. per 1000 cubic feet, and the expenses of manufacture, distribution, management, &c., 17·06d., or a total of 29·72d. Of this, 6·62d., or 18·5 per cent. of the total cost of the gas sold, might be taken as practically fixed charges. If, therefore, double the quantity of gas was sold, only the variable amount (23·10d.) would be doubled, while the fixed charges

would remain stationary. It was quite possible that 50 per cent. more work could be got out of the big mains as they stood; and assuming this to be so, they would get, instead of the 29·72d. per 1000 cubic feet as at present, 27·51d. per 1000 feet as the total cost of the greater volume of business, or a reduction in the distribution of 2·21d. per 1000 cubic feet.

Mr. Upton contended that a 40 brake horse power motor equalled in consumption 200 slot meters, inasmuch as such an engine, working fifty hours per week for fifty weeks a year, would require some 2 million cubic feet per annum, at 20 cubic feet per horse-power-hour, while the average consumption through a slot meter was about 10,000 cubic feet a year. As the cost of a slot installation, including piping and meter, appeared to be about £5, the capital outlay on 200 of them would be £1000, on which there would be depreciation and interest charges of £100 a year, or at the rate of 1s. per 1000 cubic feet. The annual charge to the power user for service and meter would be hardly worth considering; and the result would be something like this: Reduction in cost of supplying power over slot installations 1s. per 1000 cubic feet, reduction due to lessening of fixed charges by spreading same over 50 per cent. larger output 2·21d., or a total reduction of 1s. 2·21d. If, therefore, the slot consumers were charged 3s. per 1000 cubic feet, the price for power should be about 1s. 10d. This, of course, did not take into account any reductions that might be effected in the cost of manufacture by the lowering of the photometrical value of the gas or by increasing the pressure under which the gas was sent through the mains.

This latter consideration led the author to remark on the strangeness of the fact that gas-works were to-day using the same zephyr-like pressures as prevailed thirty and more years ago. They had huge trunk mains working at a few decimals of a pound per square inch, while for compressed air, natural gas, and hydraulic purposes pressures of pounds or decimals of a ton per square inch were employed. There was no doubt that the fuel-gas plants being erected in the Midlands would have to resort to some method of high-pressure distribution, if they wished to make a profit; and he quoted a number of examples of what was being done in this respect in America. If, he said, they were in the future to look to bulk and more bulk, instead of to a select few of the population, they must be prepared to supplement the present distributing system by high-pressure feeders, either (as in the case of Cape Town) by laying special high-pressure mains to certain parts of the district, or (as in the case of the East Greenwich station of the South Metropolitan Gas Company) by selecting one of the existing trunk mains, cutting off the branches, and using that as a high-pressure feeder. They all knew of villages, within a radius of 10 miles or so of a large town, which might be redeemed from darkness by the use of a small high-pressure feeder main.

Mr. Upton concluded his paper by strongly emphasizing the need for energy and an enlightened policy in the business management of a gas undertaking. He condemned meter-rents, and the wide spacing adopted for public lamps, which the local authorities should be induced to alter now that they were saving money by adopting incandescent mantles; and he advised gas people to cultivate the keenness, push, and resourcefulness displayed by electricians. If in the future they were to look forward to power production as a means of greatly increasing their business, it would be necessary for them to keep pace with the latest gas-motor practice. While they were all familiar with the smaller-sized engines, it was in the larger ones that the principal improvements had been effected. If producer gas of the Mond variety was used, costing 3d. per 1000 cubic feet delivered, this would be equivalent to (say) 120,000 B.T.U., and equal to about 185 cubic feet of ordinary gas, which, at 2s. 6d. per 1000 cubic feet, would cost 5½d. If the use of this class of power gas extended, it would prove economical to large users to instal engines and dynamos to generate their own current; and if large central stations should be established equipped with high-economy gas-motors of the three or four crank variety and all the latest improvements in electricity generation and distribution, he was afraid some gas managers would have their work cut out to keep forging ahead as they had been doing lately.

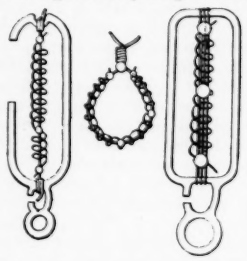
Owing to the time the meeting had lasted, it was unfortunately found necessary to defer the discussion of the paper until the autumn. Mr. Campbell, in proposing a vote of thanks to the author, said that some of his suggestions were rather startling; but there were many points which ought to be looked into, and if possible followed up. The proposal was seconded by Mr. Dougan, and cordially agreed to; and thereafter a similar compliment was, on the motion of Mr. Richmond, seconded by Mr. Upton, paid to Mr. Grafton, who was asked, and consented, to remain President of the Association.

Last Tuesday, Mr. Albert Latham, M.Inst.C.E., was presented by the Corporation and burgesses of Margate, at the Town Hall, with an illuminated address, a valuable service of silver, and a diamond ring, on the occasion of his retiring from the position of Borough Surveyor after twenty-nine years' service, and assuming the engineership of the new Wingham water scheme, which will supply the borough and twenty parishes in East Kent. Mr. Latham was also recently presented with a silver rose bowl, and an address, by 140 of the staff and employees of the Corporation.

REGISTER OF PATENTS.

Automatic Gas-Lighters.—Berthold, C. E. J., of Berlin. No. 9042; April 18, 1902.

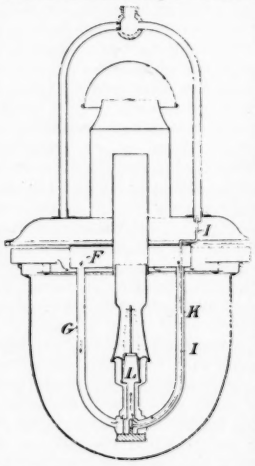
In this construction of automatic gas-lighters, straight stretched wires (preferably of platinum) are combined with a thin helical coil of platinum wire through which the stretched wire passes so as to serve as support to it and prevent it being broken; the stretched wire and wire coil being attached at their ends to a suitable supporting frame. At certain points in the length of these combined wires small pellets of catalytic material are fixed. On presenting the igniter thus formed to a stream of gas, the pellets become heated by catalytic action, and the combined wires becoming heated to incandescence, cause these to ignite the gas.



In the first arrangement shown, the platinum wire is secured at its ends to a suitable frame, and carries a helical coil of thin platinum wire, the end of which (as also an intermediate part) are united to the wire by means of pellets made either of catalytic material or of catalytic material mixed with a suitable refractory substance—the pellets being applied to the wires in a plastic condition. Or the pellets may consist of a core of plastic non-catalytic material, and (after hardening) be coated with catalytic material. In the second construction, the main wire, with a thin wire coil round it, is bent into loop form and secured to a holding device. In the third arrangement, there are several straight parallel wires secured to a frame and surrounded by a platinum wire coil attached to it by pellets of catalytic material.

Incandescent Gas-Burners.—Thomas, J., of Hornsey, and Podmore, A. E., of Herne Hill. No. 10,358; May 5, 1902.

This invention has for its object to increase the luminosity of the mantle of an incandescent gas-burner by supplying a current of heated air and gas to the interior of the mantle and simultaneously a current of heated air to the exterior.

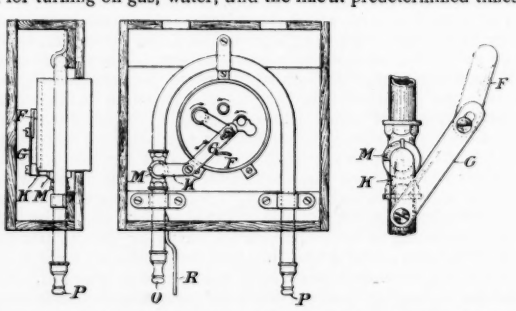


The mantle (as shown) is surrounded by a glass chimney, the lower half of which is of a more or less conical shape, while the upper part is cylindrical. It is either supported by a gallery of ordinary construction with holes in the bottom, or the lower part is fashioned so as to partly rest on and surround the holder D, which has apertures in it. Jets of air drawn through these holes are directed by the shape of the glass on to the exterior of the mantle when the burner is alight. The air, before reaching this part of the burner, is highly heated by being brought down from a heating-chamber F in the upper part of the lantern by a tube G. Air passes into the heating-chamber through holes or inlets underneath. The gas supply-pipe I may pass through the heating chamber F, and thence, through a tube K, to the casing forming the mixing-chamber L, for the purpose of heating the gas before it reaches the mixing-chamber; and heated air to the latter is also supplied by the same tube.

By this invention, it is claimed that heated air is supplied to the exterior of the mantle as well as to the mixing-chamber of the burner, and the gas supplied to the mixing chamber is also heated; and, "owing to the peculiar shape of the glass chimney, the heated air passing from the air-tube G between the outer casing of the burner and the mixing-chamber L greatly increases the illuminating capacity of the mantle."

Turning-on Gas at Predetermined Times.—North, S.W., of Leeds. No. 9150; April 21, 1902.

The illustration shows this arrangement of clock-controlling mechanism for turning on gas, water, and the like at predetermined times—a



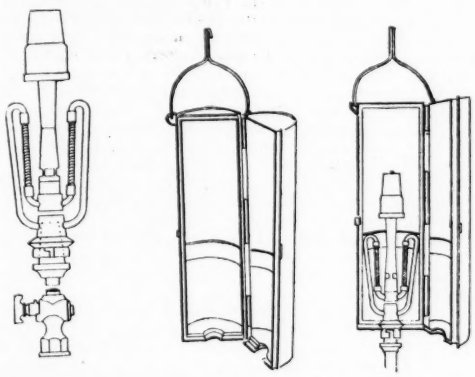
side elevation with the casing removed, a back elevation with the back removed, and a detail showing the position of levers when the gas is turned off. The clock is of the ordinary alarum, and to the winding arm is attached a lever F, which has fixed to it another lever or distance-piece G secured by a screw which works in a slot in the lever G, so as to allow the

lever to be moved in the direction of the arrow. In this way, the gas is turned off; the action also winding up the alarum at the same time. The slot is provided in the lever G so as to allow of the lever F having more travel, and thus give more winding power to the alarum part of the clock—thereby insuring the gas being turned on. The other end of the lever G is fixed to a lever K, which is attached at the other end to the turncock M. The gas enters at O, passes through the cock or stop-tap M, and out at P at the time for lighting up, as previously determined by the setting of the alarum. During the time the alarum is set and gas is not required, a small quantity of gas passes through the by-pass R, so as to retain a small bead of flame until the gas is wanted.

Fittings for Gas-Lights and Boxes for Carrying Same.—Helps, G., of Nuneaton. No. 10,789; May 10, 1902.

This invention relates to anti-vibrators for supporting incandescent burners, by attaching them to a chair or body suspended from the top of tubular arms or supports by means of metallic or other flexible tubing.

The arms or supports (as shown) are made of brass or other stiff metal tube—conveniently three in number, fixed at angles of 120° to a base connected to the gas supply. A short length of flexible tubing is attached to the upper end of each arm; and to this tubing the body or chair to carry the burner is attached. The metallic tubing, in addition to conveying the gas to the burner, acts as a spring, and so occurring takes up the vibrations in the gas-fitting and prevents them being imparted to the burner or mantle.



The base to which the stiff arms are connected may have in it a socket to receive a vertical plug attached to the lamp-cock or other suitable fitting, and thus form a simple gas-tight joint, which allows the anti-vibrator, with the burner attached, to be readily removed—thus facilitating the changing of burners for repairing, cleaning, or adjustment.

In order to safely carry such fittings, the base may have formed in it a projection of any convenient shape to fit a corresponding groove in the bottom or other portion of a box. The box is made in two parts hinged together, so as to be readily opened and adjusted on to the projections on the anti-vibrator fitting, and then closed, and secured with a spring catch. The whole burner, mantle, and anti-vibrator enclosed in a box can then be removed from the lamp or other position.

Photometers.—Turney, E, T., of San Francisco, U.S.A. No. 20,458; Sept. 19, 1902.

This invention relates to a photometer comprising a screen compounded of opaque and translucent materials, and an electric lamp of which the intensity can be varied by means for varying the current, the relative strength of which is shown on an indicator. The intensity of the light of this electric lamp is varied until it equals that of the light to be measured.

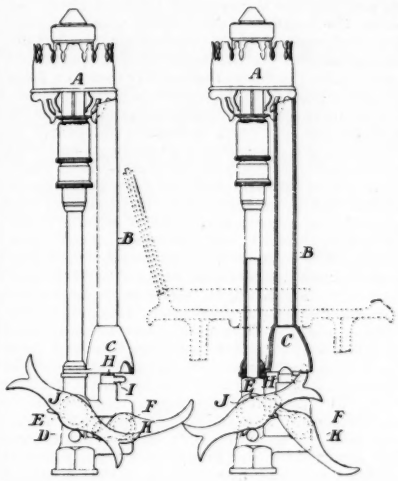
Making Incandescent Mantles Transportable.—Oppenheim, A., and Feuer, R., of Berlin. No. 27,821; Dec. 16, 1902.

The patentees remark that the places in which the incandescent mantles are produced suffer generally from the circumstance that the stiffening stuffs employed are extremely inflammable; and they propose, instead of the usual solution of nitro-cellulose (effected in ether and alcohol), to employ a suitable organic acid—especially concentrated acetic acid. They remark: The utilization of the solubility, known in itself, of collodion in other bodies than ether and alcohol, and preferably in concentrated acetic acid, has for the present problem, according to the experiments carried out, above all the result that it completely and entirely removes the inflammability of the dipping bath, and thereby the capability of explosion is removed. Moreover, the incandescent mantles produced are in no way inferior to those made by the older process.

Lighting Attachments for Gas-Burners.—Parkinson and W. & B. Cowan, of Birmingham, and A. G. Chubb, of Ironbridge. No. 25,760; Nov. 24, 1902.

This invention has relation to igniting attachments principally adapted for use in connection with the burners of gas street-lamps, but also applicable to other gas-burners for general illuminating and heating purposes—the object of the invention (as applied to street-lamps and other lamps and gas-fittings) is to provide an attachment "whereby the burner of the lamp may be easily lit and without it being necessary to open the lamp or fit the same with flaps to admit of the introduction of a light or a lighting torch into the interior." This it is proposed to effect by providing the lamp with means whereby an explosive mixture of gas and air is formed within a tube or pipe leading from the outside of the lamp to the burner, simultaneous with the admission of a limited supply of gas to the burner itself, and by providing for the ignition of this mixture by an external jet which is lit from an ordinary torch or other lighter—the flame resulting from the explosion being conducted to the burner for lighting the gas supplied thereto, after which the full supply of gas is turned on to the burner, this motion being utilized to automatically cut off the supply of gas to the lighting attachment.

Fig. 1 represents an incandescent burner provided with a supplementary lighting device or attachment in accordance with this invention. This view shows the levers or turns of the cocks which control the main gas supply to the burner and the initial supply to the lighting attachment in the positions in which they are placed when the first-named supply is full-on and the other supply is cut off. Fig. 2 shows (in section) the main burner cock in its closed position while the lighting-up cock is fully opened. In this view also a portion of the body of the lamp is indicated in dotted lines, for the purpose of showing the positions of the various parts of the burner and its fittings with respect to the lamp body.



The pipe which conveys gas to the burner A is arranged to support an auxiliary lighting-tube or ignition-pipe B, the open upper end of which is adjacent to the burner, while the lower end extends through the bottom of the lamp body to the outside, and terminates in a hood or domed, coned, or other expanded or enlarged mouth C, which is always open to admit of the free passage of air into and up the tube. Both the main burner-tube and the ignition-tube are supported above the casing or body part of a double cock-fitting D, provided with two cocks E and F and two gas-ways or passages—one in connection with the burner cock E, and leading from the service-pipe direct to the main burner-tube for controlling the main supply to the burner, while the other is in connection with the cock F controlling the initial gas supply to the burner and ignition devices, and leading from the service-pipe into a branched chamber, one branch of which communicates with the part of the gas-way wherein the plug of the burner cock works, and the other branch directed to a nipple or nozzle H, lying under the hood at the foot of the ignition-tube and preferably with its perforated upper end extending into the mouth of the hood.

The plug of the burner-cock is provided on its periphery with a groove extending from the lower end of the plug gas-way to such a distance that, when the burner-plug is in its closed or cut-off position and the lighting-up plug is open, gas may pass from the chamber by way of the groove to the burner-tube, so that when the cocks are in this position the gas entering the chamber is divided—one part being supplied to the burner, while the other part passes to the nipple H, through the perforation in its tip, and thence into and up the ignition-tube, where it forms an explosive mixture of gas and air, which is utilized for lighting the initial gas supply at the burner. On the other hand, when the initial-supply plug F is closed and the burner-plug is fully opened, communication between the burner-tube and the chamber is closed by a solid or ungrooved part of the plug being brought over the end of the branch; and thus the whole of the gas from the service-pipe passes directly to the burner.

Projecting at right angles from the side of the nipple is a branch jet I, communicating with the passage which supplies the nipple with gas It is pierced at the tip or outer end, and also along the top side, with a series of small holes, from all of which gas issues when the initial supply is turned on by the opening of the cock; so that when a torch is applied to the tip of the jet, the stream of gas issuing from the hole in it is first ignited. From this flame the other jets of the branch become ignited in succession; and as the flames run along the branch and are drawn under the mouthed end of the lighting-tube, the mixture of gas and air in the tube becomes ignited and explodes—the flame created by the explosion being carried up to the burner in the interior of the lamp, and the initial supply of gas thereto ignited.

The full supply of gas is now turned on to the burner by opening the cock E, which at the same time closes communication between the burner-tube and the initial supply cock; and in order to automatically and simultaneously cut off the supply to the ignition-nipple and perforated branch jet, the plug of the cock is provided with a double armed lever J, whose movement in both directions is limited by stops on its lower edges—adapted to come against a peg standing from the side of the plug casing. One arm or branch of the lever has a stud or right-angled projection arranged to come in the path of an arm or extension of the lever K of the initial supply cock; the arrangement of the several parts being such that when the burner-cock lever is turned into the position for opening the full supply, the impingement of the stud on the lever extension of the other cock turns the latter in the reverse direction. In this way, as the one cock is opened the other is closed; but the turning of the main burner cock lever in the opposite direction for cutting off the gas to extinguish the lamp does not affect the position of the initial supply cock lever, which remains closed until the burner requires to be again lighted.

PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

Looking backward, many sessions of Parliament would have to be passed over before one could be found that would balance the present session in the smallness of the weight of contentious gas and water matter that has or will engage the consideration of Select Committees of either House. It has indeed been a session of extreme dulness; and the only really good feature, so far as opposed measures are concerned, has been the Crystal Palace District Gas Company's Bill. We cannot look for anything now of a really lively nature. One result of this barrenness has been that many of the Experts and Counsel whom one is accustomed to see during the session in the lobbies and committee rooms have been rarely in evidence. This has been their loss, but the gain of promoters and opponents. At the same time, Experts and Counsel have not been idle; and it is due to them to say that to a large extent the barrenness of the session is the outcome of their influence and guidance. The loss of work in the committee rooms is not on account of the fewness of the gas and water measures this year. In the number of Bills of these classes, the session is an average one. But the smallness of the number that has engaged the attentions of Committees is owing entirely to the agreement that has been going on on all sides between opponents and promoters; and, in producing this state of affairs, the expert advisers of the parties have taken a by no means small part. This is to their credit; and the more they can work to this end behind the scenes, the greater will be the confidence of their clients in them. Agreement cannot always be effected; but session after session has produced notorious examples where settlement could have easily been accomplished. In the past week, there has been nothing doing of an exciting nature. The seal to the adjustment of the differences between the Gaslight and Coke Company and their antagonists, as had been foreshadowed would be the case, was set on Tuesday. The end of the week saw the preamble of the North-Western Electricity and Power Gas Bill proved by the Lords Committee before whom it has been fully discussed. The Oldham Corporation Water Bill was thrown out; and one or two other Bills of less importance have been dealt with and reported for third reading. The subject of electrolysis has again cropped up; and free wiring and the supply of electrical fittings have been incidentally discussed. The South Metropolitan Company lodged a petition against the Bill of the Woolwich Borough Council in connection with the supply of electrical fittings; but the clause was withdrawn before the measure reached the Committee to whom it had been referred. The Derby Gas Company's Bill continued in the list until Friday. But that day it was announced that the opposition had been completely satisfied; and so the measure goes forward unopposed. The terms of agreement are stated in the next column. The Bradford Corporation Bill, which contains a part referring to gas, is in a group the consideration of which has already been commenced.

Gaslight and Coke Settlement. The Committee over whom Sir John Brunner had been presiding with radiant ability lost, through personal claims elsewhere, his services last week. His position was taken by Sir Robert Gunter. On the reassembling of the Committee on Tuesday, their attention was directed to the Gaslight and Coke Company's Acts Amendment Bill (promoted by the London County Council) and the Gaslight and Coke Company's Bill; but the proceedings were purely formal. Through the disclosure, at a meeting of the Common Council of the City of London, of the terms upon which the Gaslight and Coke Company had agreed with the principal petitioners against their Bill, we were able to announce those terms in the Parliamentary Notes published in the last issue of the "Journal." The agreement (which was to be subject to the approval of the Commons Committee) carried with it the withdrawal of the County Council Bill and of their opposition to the Company's measure. The conditions of the settlement also satisfied the City Corporation and other Local Authorities—excepting, on small points, West Ham and Lambeth. Broadly speaking, in some respects, though not in degree, there was a likeness in the objects of the two Bills. The County Council sought to alter the Company's standard price and the prescribed illuminating power of the gas, and to make provision for the supply of burners and for a capital redemption fund. Having found on three occasions that ignoring altogether the recommendations of Sir James Rankin's Committee did not avail them in their efforts to secure extended parliamentary powers, the Company came this session with a measure which revealed the adoption by them of a corrective policy. They proposed the raising of additional capital, the alteration of the standard price and the sliding scale, the establishment of a capital redemption fund, and provision in respect of certain lands in their possession. So that, with the exception of the clauses providing for and touching upon the lowering of the illuminating power of the gas, the Bill had, in two of its main features, some resemblance to that promoted by the County Council. It is due to Colonel Sir W. T. Makins, Bart., the Governor of the Company, to say that Sir Ralph Littler, for the County Council, acknowledged that Sir William had put himself into "the fullest and frankest communication" with the Council, with the result stated. The terms as published last week are in substance correct, though in respect of the redemption fund a little further explanation is necessary for clearness. It will be remembered that the proposed additional capital powers of the Company have been reduced from £1,000,000 to £750,000; that the standard price is to be 3s. 4d., instead of 3s. 6d. as proposed by the Company, or 3s. 3d. as suggested by the Council; and that the Company have given an assurance that they have no intention of varying their practice to the charge meterrents. As to the capital redemption fund, our information last week was not particularly lucid. The Company, it may now be explained, are, out of the divisible profits in excess of the amount needed to pay the standard dividend for a year of 4 per cent., to set aside a sum for the redemption fund not exceeding £10,000; then they may pay an additional dividend up to 6s. 8d. But before they can pay more, they must out of divisible profits set aside for the fund a sum not exceeding £20,000; and then they may distribute 13s. 4d. per cent. additional dividend above the standard. And so on by the same steps, if the divisible profits will admit, until £40,000 a year can be transferred to the fund. With the money so set aside, the Company are to purchase ordinary stock in the open market in the following year, and then cancel it until ordinary stock to the nominal amount of £1,000,000 is extinquished, when the fund and provisions will cease to operate. The terms and their effects are discussed at length in another column, so that further reference need not be made to them here. The remnant of opposition to the Bill was of small moment. The old question of the difference in price north and south of the Thames in the Company's area was raised; but this had no claim on the Committee. The only concession that was made was to West Ham; and this took the shape of a testing-place at the Company's office in the Tidal Basin Road. With this exception, the Bill as amended under the agreement passes forward. The general opinion among gas men who frequent the committee rooms is that the Company, under their peculiar circumstances, have come well out of their precarious position.

Derby Gas Bill. The Select Committee of the House of Lords presided over by Lord Clifford of Chudleigh on Friday were expected to consider this Bill. When it was reached, however, Counsel stated that the opposition had been withdrawn, and that therefore the Bill would go forward as an unopposed measure; an agreement having been come to the previous day with the Derby Corporation, whereby they withdrew their petition. Earlier in the week, the Chairman of the Company, Mr. H. Swingler, D.L., accompanied by the Engineer (Mr. J. Ferguson Bell) met, in London, Alderman Horne, J.P., the Chairman of the Corporation Parliamentary Committee, who was accompanied by the Town Clerk (Mr. Trevelyan Lee), to discuss and come to an agreement upon clauses; each party being advised by their Parliamentary Agents—Messrs. Dyson and Co. for the Company, and Messrs. Sharp and Co. for the Corporation. This meeting was to carry out a provisional agreement already arranged between Mr. Swingler and Alderman Horne. The Company's Bill is an extensive one, embracing an expansion of limits of supply, consolidation of stock, new capital, and, instead of a maximum price with fixed dividends, a standard price and sliding scale, reduction of candle power, relaxation of sulphur impurities, powers to hire and supply gas fittings—engines, stoves, and other apparatus, appliances, &c., for lighting and motive power, warming, ventilating of houses and buildings, for the cooking of food, and all other purposes for which gas can or may be used—powers to lay down pipes for ancillary purposes, and powers enabling the Company to issue specifications of internal fittings, and the construction and placing of pipes, &c., on consumers' premises. From this it will be seen there were plenty of items to make a big parliamentary fight between the Corporation and the Gas Company; and it looked—several conferences having taken place without result—as if the questions in dispute between the two parties would have to be decided in the committee room. However, within the last fortnight, thanks to Mr. W. Hart, F.C.A., who was engaged by the Company as their Professional Accountant, and who also happens to be a prominent member of the Derby Corporation, the parties were again brought together; and a provisional agreement was arranged by the respective Chairmen (Mr. Swingler and Alderman Horne), assisted by the Town Clerk and the Company's Engineer. The Company's 10, 7, and 5 per cent. stock, which amounts in all to £288,073, will be consolidated into £424,073 of 5 per cent. stock, under a sliding-scale. The new capital asked for by the Company in the first instance was £150,000 of 5 per cent. stock, with one-third borrowing power, and £45,000 additional borrowing in respect of the old capital—making in all £245,000. The Company agreed to reduce this to £120,000 of new 5 per cent. stock, with £50,000 borrowing powers, making in all £175,coo, inclusive of premiums. A standard price of 3s. 2d. was asked for in place of the present maximum price of 3s. 6d. per 1000 cubic feet. The standard price agreed upon is 2s. 10d., with a neutral zone of 3d., and an additional 3d. for the outside districts. These prices carry 1s. 3d. on each £100 of 5 per cent. stock each half year for each penny either increase or decrease below 2s. 10d. or above 3s. 1d. charged for gas to ordinary consumers within the borough. The Company asked for the usual insurance fund, and, in addition, a renewal fund, the latter of which was given up. The insurance fund is to be calculated upon the capital actually expended, is limited to 1 per cent. in any one year, and is not to exceed one-twentieth of the expended capital. The illuminating power is reduced from 15 to 14 candles; and the Wandsworth burner is to be used for testing. The sulphur impurities allowed are also increased from 20 to 25 grains, with a six days' average. Testing for illuminating power and quality is to be *on week days only*. (This seems to indicate the hand of Sir George Livesey.) The Corporation in their petition against the Bill asked that provision should be inserted to enable them to execute any necessary works in any street at the cost of the Company, and that water gas should be prohibited, or limited to a very small proportion of the gas made. These were given up upon the Company agreeing to make the concessions already stated. As mentioned last week, the Company have been advised by Sir George Livesey and Mr. Charles Hunt, and the Corporation by Messrs. H. E. Jones and Son; and it is satisfactory to be able to state that the negotiations on both sides have been carried out with a pleasant friendliness. Thanks to the Town Clerk (who shows a remarkable grasp of the trend of modern gas legislation) the Corporation have obtained all they could have reasonably expected even if the main points in dispute had been settled by Parliament, with an accompanying big bill of costs. The Chairman of the Company, with the assistance of the experts named, will, when the Bill is passed, have placed the Company in a position to work under modern and up to date requirements, which will without doubt be equally beneficial to the consumers and the shareholders.

North-Western Electricity and Mond Gas Bill. The promoters of this measure appear to be in a fair way of getting the large tract of country that they have mapped out for themselves for parliamentary rights to the supply of electricity and Mond gas for power purposes. Opposition by fifteen gas companies and several gas and electricity supplying local authorities

has had no effect so far in staying the progress of the measure; the Committee of the Lords who have had it under consideration for the best part of seven days having declared the preamble proved, subject to certain conditions and reservations. The scheme was outlined last week, in a few notes on the progress of the proceedings to the end of the sitting on the previous Friday. The interest in the measure continued unabated; and, if anything, the crowd of interested spectators was reinforced by new comers from the counties concerned. A prodigious amount of evidence was given on behalf of the promoters, who called, in addition to engineering witnesses, numerous manufacturers to assure their Lordships that a large percentage of industrial costs would be saved if a supply of Mond gas could be obtained. The opposing gas companies and the authorities who asked to be excluded from the scope of the Bill sought to prove the impossible and speculative character of the scheme, in order to overthrow it. In doing this, however, they also proved that in it they have little to fear. To plead that their statutory rights should be protected is one thing and is good, but to show that the scheme contains the germs which will produce the disease that will result in its death is a confession of belief that natural causes will in time relieve them of the competitor in the field of gas supply for power purposes. It is true the feasibility of the transmission of Mond gas over large areas is still a matter of uncertainty; and it is equally true that the capital proposed appears to be, and palpably is, altogether disproportionate to the unreasonably large area the promoters are seeking to absorb. But to present such evidence to the Committee showed the opposition were making much ado over something that they think will work out its own destruction. It was argued that the passing of the Bill would paralyze the action of the gas supplying companies and authorities. They must not allow it to; but they must as far as possible meet like with like. The Mond gas scheme cannot be carried out in a day; and everything—time, opportunity, and plant—is on the side of the gas suppliers to enable them to put themselves in a position, through low-power gas at a cheaper rate, to ward off any tangible effect from the new competition. This is the tendency of the times; but Parliament must be shown that gas suppliers are willing and able to persevere in this direction. Among the witnesses who went into the chair in defence of the existing gas interests were noticed Mr. Charles Hunt, Mr. Corbet Woodall, Mr. Hubert Pooley (of Stafford), Mr. James Pye (of Chester), and Mr. S. Meunier (of Stockport); and, as mentioned last week, Mr. H. E. Jones gave support to the promoters. There were throughout the proceedings several other gas men present from the proposed area of supply. However, as already stated, the Committee found the preamble proved, subject to certain conditions. They would not reduce the area of supply, nor exclude from the operations of the Bill any of the boroughs within it. But the powers of the promoting Company were restricted to the distribution of electricity and Mond gas. The Committee also required the insertion of a clause prohibiting the use for illuminating purposes of electricity supplied for power, and of a clause precluding the promoters from selling rights acquired under the Bill to other corporations. The Committee were against limiting the power of the Company to grant licences for the use of Mond gas; but they refused to permit other persons coming in and sharing the rights over roads, and other rights conferred by the Bill. In the matter of protection of existing rights, in evidence of ability and willingness to themselves do all that is desired, in showing that this ability makes unnecessary a scheme of such a nature as this, and in forcing upon the attention of Parliament the desirability of not allowing such large and unreasonable powers to pass into the hands of a few wealthy speculators until the South Staffordshire scheme has proved itself, can be found ample material for further strong opposition. It is therefore hoped that the contest will be vigorously continued by the gas suppliers concerned in the Lower House.

Electrolysis. The Brighton and Hove Gas Company have not been so successful as they were in the session of 1900 in connection with their fight over the question of the protection of, and liability for injury to, their trunk mains by electrolytic action. Those who know the Brighton Gas-Works will be acquainted with the narrow roadway passing the front of the works, and along which the trunk gas-mains are carried for the supply of the district. The narrowness of the road and the largeness of the trunk mains make the position the more serious; and, in the protection of this vital point in their distribution system, the Company and their Engineer (Mr. Joseph Cash) have in the past fought hard and long. In 1900, they obtained a protecting clause in connection with the Brighton Corporation Act, which conferred powers for the construction of works for electric lighting; but, after intervals of fighting over three days before Lord Newton's Committee last week, they failed to get similar protection in connection with the proposed scheme of tramways for Hove, Worthing, and the district. The position in connection with this question of electrolysis is one of confusion. Special protection is accorded in some cases; and, on the other hand, there are instances in which even *locus standi* has been refused. Thus there is nothing definite for the guidance of Committees. Reference to the subject is made in our "Electric Lighting Memoranda" this week.

Oldham Water Scheme Rejected. The huge opposition which the Oldham Corporation Water Bill encountered has prevailed; the Lords' Committee who considered the measure finding, after two day's further hearing last week, that the preamble was not proved. As was explained in last Tuesday's notes, the scheme contemplated the purchase of the undertaking of the Deanhead Reservoir Commissioners, and the construction of additional works at a cost of £305,000. For the opposition—which comprised Local Authorities, a Rivers Board, a Railway Company, owners and occupiers of mills, and others—many men of high repute appeared as witnesses, and declared the scheme would do great harm to the important manufacturing interests in the midst of which the Deanhead undertaking is situated. The representatives of every opposing body contended that they had a prior claim to the water—Huddersfield being perhaps foremost in holding this. Let us see. The watershed in question has been lying vacant for years; and the Deanhead Commissioners would have been glad long since to have rid themselves of the entire undertaking by obtaining a purchaser for it. To many places it has been offered. Wakefield, Halifax, Morley, Huddersfield, and other towns have had the option of buying; but all have refused. Directly, however, a purchaser was found in Oldham, who sadly want an additional supply for their quarter of a million of inhabitants, then there arises this great outcry about the conservation of local rights. It was suggested that Oldham should get a water supply from the Manchester Corporation; but it may be that Manchester would not consider a big town like Oldham an altogether desirable customer for their Thirlmere water. Much better is it for a town of the importance of Oldham to be in an independent position in regard to water. Public expediency appears to weigh very strongly on the side of Oldham; but their Lordships thought otherwise. We shall look with interest to see whether one of the other big authorities take advantage of the success of their antagonism to secure possession of the still vacant watershed. If one of them does so, it may be found by the smaller contributors to the overthrowing of the Bill that they will not get any more satisfaction in the way of considerate treatment than they might have obtained from Oldham. General rejoicing there may be that the water is not to be diverted from the Calder Valley into Lancashire. But larger authorities have gone far from their own limits for water, and have succeeded in persuading Parliament as to the necessity. This being so, it certainly seems hard on Oldham that they should not be allowed to satisfy their needs from the nearest available and hitherto unsought-for water area.

Mr. Dempsey's Locus Standi. How the crotchets of a single person can waste the time of many others and occasion unnecessary expenditure of money is illustrated by the action of a Mr. Dempsey over the Belfast Water Commissioners' Bill. The individual named is a member of the Belfast Corporation; and he single-handed offered fight in Parliament against the measure, as he was possessed of some illusory idea that it would increase his rates. The principal object of the Bill is to empower the Water Commissioners to raise the moderate sum of £10,000 of additional capital to supply the means for increasing their reservoir capacity and extending the limits of supply. It follows that if these simple proposals would encroach on Mr. Dempsey's pocket, it would have a similar effect on the inhabitants generally in Belfast and the district; but nobody but Mr. Dempsey petitioned against the measure. He has put the Commissioners to the expense of preparing to meet opposition, of briefing Counsel, and of making an appearance before Lord Clifford of Chudleigh's Committee. To what purpose? Merely to hear a declaration from their Lordships that they could not recognize Mr. Dempsey's *locus standi*. It would have served that litigious person right if he had been made to bear the whole costs of his action. He would then have learnt something as to the folly of being "penny wise and pound foolish."

New Hunstanton Gas and Water. The Improvement Bill which the New Hunstanton District Council promoted this session has had an easy run before the Police and Sanitary Committee of the Commons; the only petitioners being the Great Eastern Railway Company. Both gas and water improvements had a place among the other projects; but nothing more than explanations by Mr. E. H. Stevenson were required to satisfy the Committee on these points. The increase in the sale of gas demands the construction of additional works at a cost of £17,000. Then under terms agreed with the freeholder, the Council desired power to acquire the freehold of the land on which the springs—the source of the water-supply—are situated, as well as authority to construct new works, and to protect the wells from the encroachment of the sea. The cost of these water-works improvements was estimated at £12,000. The promoters' requirements in these respects were allowed. The Committee granted fifty years for the repayment of the money borrowed for water-works purposes, and thirty years for the gas works loan.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills brought from the Commons, read the first time, and referred to the Examiners: Commercial Gas Bill, Gorleston and Southtown Gas Bill, Hyde Corporation Bill, Nelson Corporation Bill, Scarborough Gas Bill.

Bills read a second time and committed: Maidstone Gas Bill, Sittingbourne District Gas Bill.

Bills reported: Belfast Water Bill, Chard Corporation Gas and Electricity Bill, East Ardsley Gas Bill, Maidstone Gas Bill, Oldham Corporation Bill [preamble not proved], Scunthorpe Urban District Water Bill, Shepshed Urban District Gas Bill.

Bill read the third time and passed: Birmingham Corporation Bill.

The opposition to the Derby Gas Bill has been withdrawn.

The Bradford Corporation Bill has been referred to a Select Committee, consisting of Lord Brougham and Vaux (Chairman), the Duke of Manchester, the Earl of Verulam, Lord Sinclair, and Lord Sudley; and the first meeting took place last Thursday. Among the petitioners against the Bill are the Pudsey Corporation, and the Urban District Councils of Calverley, Clayton, Drighlington, Farsley, Hansworth, and Shipley.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills brought from the Lords, read the first time, and referred to the Examiners: Birmingham Corporation Bill, Rickmansworth Gas Bill.

Bills read a second time and committed: Faversham Gas Bill [Lords], Hexham Gas Bill [Lords], Local Government Provisional Orders (Gas) Bill.

Bills reported: Gaslight and Coke Company Bill, Gaslight and

Coke Company's Acts Amendment Bill [parties do not proceed], Plymouth and Stonehouse Gas Bill [Lords].

Bills read the third time and passed: Commercial Gas Bill, Gorleston and Southtown Gas Bill, Hyde Corporation Bill, Nelson Corporation Bill, New Hunstanton Improvement Bill, Scarborough Gas Bill.

HOUSE OF COMMONS COMMITTEE.

Tuesday, May 12.

(*Before Sir* ROBERT GUNTER, *Chairman, Mr.* CHAPMAN, *Mr.* PRIESTLEY, *and Mr.* JAMES HEATH.)

GASLIGHT AND COKE COMPANY'S ACTS AMENDMENT BILL AND GASLIGHT AND COKE COMPANY'S BILL.

The main object of the first of the above-named Bills, which was promoted by the London County Council, was to alter the standard price to be charged for gas by the Gaslight and Coke Company, and also its prescribed illuminating power, and to make provisions for the supply of burners and for the formation of a capital redemption fund. The other Bill, promoted by the Company, was chiefly to enable them to raise more money, alter the standard price of gas, redeem capital, and purchase and hold lands.

Sir RALPH LITTLER, K.C., Mr. TALBOT, and Mr. WILKINSON appeared for the County Council; Mr. BALFOUR BROWNE, K.C., Mr. CLAUDE BAGGALLAY, K.C., and Mr. DANCKWERTS, K.C., for the Company. Mr. E. MORTEN represented the West Ham Corporation; and Mr. COURTHOPE-MUNROE, the Lambeth Borough Council.

Sir RALPH LITTLER, in opening the case for the County Council, said that what might have been an exceedingly long inquiry would be very much shortened, because, after many years of fighting, the matters had narrowed themselves down. The learned Counsel then dealt exhaustively with the history of the Gaslight and Coke Company from the year 1857, and stated that they had a nominal capital of something like £26,000,000, and that the standard dividend was now 4 per cent. He referred to the recommendations of Sir James Rankin's Committee in 1899, among them being that the old standard price of 3s. 9d. should be reduced to 3s. 3d., and that there should be the same standard of increase and decrease as that then in existence. They suggested further that there should be a sort of secondary scale (which was not material to the present inquiry), and that any company having obsolete or unproductive capital should make an effort, by the provision of a sinking fund, to get rid of it, so that no dividend should be declared on capital which had ceased to be productive. Counsel then proceeded to state the circumstances under which the Company's Bill of 1900 had been rejected, and that of 1901 withdrawn. Last year no Bill was introduced; but the County Council became aware, from the address by the Governor of the Company (Sir W. T. Makins, Bart.) to the shareholders in that year that it was the intention to introduce one in the present session. The Council then came to the conclusion that it was necessary for them to bring in a Bill. It was promoted very largely in consequence of several of the Metropolitan Borough Councils, who had then come into existence, stating that something must be done. A conference was held, at which representatives of the Council, the Corporation of the City of London, and many of the Metropolitan Boroughs were present, and certain resolutions were passed. As a result, the present Bill was introduced, which proposed to give effect to the recommendation to reduce the standard price for 16-candle gas to 3s. 3d. per 1000 cubic feet, and also as to the redemption of obsolete capital. Sir W. T. Makins, Bart., had put himself into the fullest and frankest communication with the Council, and the result had been that—acting, of course, in the interests of the public, but at the same time with an extreme desire that the constant conflict between the greatest Gas Company and the greatest Municipal Authority in the world should cease—these two bodies had put their heads together and come to an agreement. As to some of its points, they did not quite like them; but it was thought that it was better not to quibble about trifles, but to submit to the Committee for their approval—because it must be by their approval—what they believed to be a satisfactory and reasonable solution of the question. If the Committee agreed to it, the Council's Bill would be withdrawn in favour of the Company's, as amended. In the meantime, the Council's Bill would be postponed. The learned Counsel then read the following heads of the agreement:—

1.—The London County Council's Bill (Gaslight and Coke Company's Acts Amendments Bill) to be withdrawn.

2.—The Company's Bill to proceed, with the following modifications:—

Clause 4.—Capital powers applied for to be reduced from £1,000,000 to £750,000.

Clause 8.—The standard price to be 3s. 4d. instead of 3s. 6d. as proposed by the Company's Bill, or 3s. 3d. as proposed by the Council's Bill.

3.—As regards meter-rents, Counsel for the Company to make the following statement to the Committee: "The policy of this Company is not to charge meter-rents, and the Directors have no intention of reimposing the charge in the case of ordinary consumers; but they object to the power of making the charge being taken from them, while it is both retained and exercised by the other Metropolitan Gas Companies." Counsel for the London County Council to state: "The Council have assented to the suggested price of 3s. 3d. proposed by their Bill being altered to 3s. 4d.; and they agree to the standard price being fixed at this figure, in view of the policy of the Company not to charge meter-rents, and of the assurance of the Company that they have no intention of varying their practice in this respect."

4.—Clause 9 to be struck out of the Bill, and the following clause substituted:—

Redemption Fund.

(1) Before the Company shall be entitled to, or shall, in respect of any calendar year after the calendar year 1903, distribute (A) an increased dividend in excess of the standard dividend, the Company shall, out of the divisible profits in excess of the amount needed to provide the standard dividend for the year, and before distributing any increased dividend, set aside a sum up to and not exceeding £10,000, and after setting aside the last-named sum, they may distribute, by way of addition to the standard dividend, an increased dividend up to 6s. 8d. per centum, or (B) an increased dividend in excess of £4 6s. 8d. per centum, the Company shall, out of the divisible profits aforesaid, and before distributing any dividend in excess of the last-named sum per centum, set aside a sum up to and not exceeding £20,000, and after that may distribute an increased dividend up to 13s. 4d. per centum, or (C) an increased dividend in excess of £4 13s. 4d. per centum, the Company shall, out of the divisible profits aforesaid, &c., set aside £30,000, and afterwards may distribute an increased dividend up to £1 per centum, or (D) an increased dividend in excess of £5 per centum, the Company shall, out of the divisible profits, &c., set aside a sum up to and not exceeding £40,000. The several sums so from time to time set aside shall form a redemption fund, provided that nothing in this section shall authorize the Company at any time to distribute any dividend in excess of the authorized dividend, and that, for the purpose only of calculating the amount distributed in accordance with this proviso, the amount set aside as redemption fund shall be assumed to have been distributed by way of dividend.

(2) "Divisible profits" in this section mean the whole amount of the Company's clear profits (inclusive of profits carried to the credit of divisible profits from any preceding year) available for distribution in dividends to the Company's capital stockholders in respect of any calendar year.

(3) The Company shall not, in respect of any one calendar year, distribute to the holders of ordinary stock of the Company dividends to an amount exceeding £4 per centum upon the total nominal amount of such ordinary stock for the time being continuing to subsist, without making such provision for the redemption of ordinary stock as is by this Act provided for.

(4) Subject as aforesaid, the Company may apply the divisible profits in any manner in which but for this Act they can for the time being apply the same.

(5) The Company shall apply the said redemption fund during the year following that in respect of which it is set aside in purchasing, in the open market, ordinary stock of the Company, which stock is, upon the completion of every purchase thereof, to be cancelled, and shall thenceforth be, and be taken to be, extinguished.

(6) This section shall not come into operation before the year 1904, nor in regard to the dividends distributed in respect of the year 1903.

(7) In order that the price of the Company's gas may be kept down as low as the profits admit, it shall not be obligatory on the Company to set aside, during the continuance of this section, out of revenue, any sums for the purpose of, or with regard to, the extinction, redemption, or writing off of obsolete capital.

(8) This section shall cease to operate when the Company have, by means of the redemption fund aforesaid, purchased and extinguished ordinary stock of the Company to the nominal amount of £1,000,000; and a certificate, under the hand of the President of the Board of Trade for the time being, shall be conclusive evidence of the total amount of the Company's ordinary stock from time to time purchased and extinguished by means of the said redemption fund.

The Company's Bill was then considered.

Mr. CLAUDE BAGGALLAY opened the case for the promoters. He stated that there were four principal objects in the Bill—first, the raising of additional capital; second, the alteration of the standard price and the sliding-scale; third, the establishment of a redemption fund; and fourth, making provision with regard to certain lands belonging to the Company, or held in trust for them. The Bill was the same, with regard to its objects, as the three Bills promoted by the Company in 1899, 1900, and 1901, so far as the raising of additional capital and the question of the lands were concerned; and it also included the two other objects named, in order to comply with the recommendations of Sir James Rankin's Committee. The Company's Bill of 1901 did not pass the second reading in the House, partly because the promoters had not then sufficiently adopted those recommendations, and also, he believed, because there was a very strong opposition on the part of some of the new Metropolitan Boroughs, who thought the proposals dealing with the district of the Company south of the Thames would, if that district were transferred to the South Metropolitan Gas Company, be injurious to them. As to Sir James Rankin's Committee's first recommendation with regard to the standard price and the sliding-scale, that was proposed to be dealt with in clause 8 of the Bill. There the original proposal was to reduce the standard price of the Company, which was at present 3s. 9d., to 3s. 6d. The Company's standard was originally settled by Parliament, when it fixed the prices of the South Metropolitan and Commercial Companies at a higher amount. The Company thought that a reduction to 3s. 6d. for 16-candle power gas was the proper equivalent to the reduction on the south side of the water in the case of the South Metropolitan Company. However, as a result of the negotiations with the County Council, the Company had agreed to make a further reduction to 3s. 4d.

In reply to a question by the Chairman,

Mr. BAGGALLAY explained that the standard price in the South Metropolitan Company's district was 3s. 1d.; but the 2d. difference between that and the 3s. 3d. was represented by the difference between the 14-candle gas of that Company and the 16-candle gas of the Gaslight and Coke Company. The Directors had discussed the matter with the Council, and had pointed out that there was also the difference that the Company did not charge meter-rents; and it was agreed that 3s. 4d. would be the proper equivalent to the 3s. 1d. If, after the statement in the agreement which had been read, the Company did charge meter-rents, they would fare very badly when at the end of five years they had to come to Parliament for further capital powers. As to capital expenditure, he would only mention that the Company's district extended over some 60 or 65 square miles. Portions of it were 15 miles from the works at Beckton. It was an enormous system, and gas-testing stations were dotted about it in all parts of the Metropolis.

The following evidence was then given.

Mr. *J. W. Field*, the Secretary and General Manager of the Company, in reply to Mr. DANCKWERTS, said that in 1868 they obtained a consolidating Act of Parliament; and it was under it, with the amending Acts, that they now worked. He gave an explanation of the working of the sliding-scale, and of the circumstances under which the obligation had been imposed upon the Company to charge south of the Thames a price no higher than that of the South Metropolitan

Gas Company. There being now a difference of 2 candles between the illuminating power of the gas supplied by the two Companies, an extra 2d. per 1000 cubic feet was charged by his Company south of the Thames—Parliament having fixed the difference in value at 1d. per candle. Witness next gave evidence as to the capital powers of the Company, &c. They originally proposed by the Bill to raise £1,000,000 by 3 per cent. debenture stock; but, by arrangement with the County Council, the figure had been reduced to £750,000. He was afraid they would not be able to get this amount at 3 per cent., but hoped to be able to do so. This was the cheapest way of raising the money. The capital was needed for the following purposes: Mains and service-pipes, £130,000; service-pipes for automatic consumers, £100,000; meters for ordinary consumers, £60,000; stoves, £130,000; automatic supply, £160,000; stoves for automatic consumers, £90,000—making a total gross expenditure of £670,000. The average annual expenditure for the five years since 1896 had been £140,837, which would make for the five years £704,190. Against the £670,000 had to be set the liquidation of the suspense account in connection with the automatic meter supplies, which would amount to £112,000 in the next five years, which left on distribution expenditure a net sum of £558,000. The details of this would be proved by the Distributing Engineer, if necessary. Additional working capital was required for labour-saving appliances; bringing up the total to £960,000. The £750,000 asked for was, of course, considerably below that. The standard price of 3s. 4d. gave a standard dividend of 4 per cent.

In cross examination by Mr. MORTEN, witness said the Company proposed to continue charging consumers north of the Thames more than those on the south. There was now no loss on the south, although there had been. He did not think the loss had amounted to £10,000 per annum.

In answer to a question by the Chairman,

Mr. MORTEN said there was only one testing-place in the borough he represented, and there was no provision in regard to the testing of gas.

Mr. DANCKWERTS dissented.

Mr. MORTEN: What is the objection to giving us a testing-place (say) at Canning Town?

Witness: We want to wait until the Board of Trade Departmental Committee have decided it.

That Board of Trade inquiry may hold the whole thing up for four or five years?—It may; but we hope it will not.

After some further questions, witness agreed that a testing-place should be provided at the Company's office in the Tidal Basin Road; the testing to be done by Mr. Young, in accordance with the provisions of their Acts.

Mr. MORTEN said that satisfied him. With regard to his other points, he was contented to adopt the attitude of the London County Council.

Mr. *G. C. Trewby*, the Company's Consulting and Constructing Engineer, was then called with regard to the capital proposed to be raised.

The CHAIRMAN said the Committee required no evidence on that matter.

Mr. COURTHOPE-MUNROE, for the Borough of Lambeth, asked for a clause to be inserted making it obligatory upon the Company not to charge a higher price south of the Thames than that charged by the South Metropolitan Gas Company.

The CHAIRMAN said the Committee did not think it necessary to insert it. They found the preamble of the Bill proved.

Mr. TALBOT having formally withdrawn the County Council Bill,

A clause was inserted enabling the Council to pay the costs of their Bill out of their county fund for general county purposes.

The remaining clauses were then adjusted, and the Bill was ordered to be reported to the House.

HOUSE OF LORDS COMMITTEE.

Thursday, May 7.

(*Before Lord* GLANUSK, *Chairman*, *Earl* ABINGDON, *Lord* BARNARD, *Lord* DE MAULEY, *and Lord* ABERDARE.)

NORTH-WESTERN ELECTRICITY AND POWER GAS BILL.

This was a Bill by which it was sought to incorporate a Company with powers to provide electrical power and power gas over the whole of the county of Chester, and parts of Staffordshire, Derbyshire, Flintshire, and Denbighshire. There were numerous petitions against the Bill from county and borough councils, local authorities, and gas companies within the area proposed to be covered by the promoters.

Mr. BALFOUR BROWNE, K.C., in opening the case for the promoters, said they desired powers to establish large generating stations and plant for the manufacture of power gas, or producer gas, or Mond gas, over a populous manufacturing district. Parliament had in a former Bill approved the two principles, and had sanctioned the production of gas for power purposes and for the generation of electricity in one measure. The production of electricity by power gas was the cheapest method possible. The current would be available over a larger area than the power gas; but the manufacturers of the district could have either gas for power or electricity for power. The clauses suggested by Sir James Kitson's Committee some years ago had been incorporated in the Bill, so that the Company would have no general powers for lighting purposes; and where a local authorlty was authorized at present to supply electricity, their consent would be required before the Company could supply it. The Board of Trade were, however, given the power to override the decision of a local authority refusing to give consent, if the local authority were not themselves furnishing the requisite supply on reasonable terms within their area. But there was due protection of local authorities in the Bill, because clause 23 provided that the powers of the Company for supplying electrical energy should be limited to supplying it only to "authorized distributors," and persons "requiring a supply for power." The energy, however, might be used for the lighting of the premises where the electricity was being utilized for power purposes. Beyond that, the Company asked no power to supply electricity for lighting purposes; so that they were not entering into competition with any local authority or with any gas company established for purely lighting purposes. The capital of the Company was to be £1,500,000 in shares, with power to borrow in addition £500,000. The area proposed to be covered was about 2000 square miles; and the population within it was about 1½ millions. The Company had arranged with the patentees of the Mond gas for a licence, giving them exclusive rights to work the patent in the area for a considerable number of years. Mond gas was made from cheap bituminous fuel commonly called slack, of which there were large supplies within the proposed area. For many purposes, Mond gas was more convenient than coal gas; being cheaper and cleaner, producing no smoke, and no coke or ashes. It was a power very well adapted for use in gas-engines; and it was a most economical method. For 8d., the manufacturer would get the same results from Mond gas as he could get from the ordinary gas in his district which would cost him from 3s. to 4s. per 1000 cubic feet. To leave the areas of the petitioning borough, county, and other local authorities out of the Bill would be to destroy the whole measure, which was designed not to trench upon the functions of the local authorities or existing lighting companies, but to do something which would be a benefit to trade and to traders in this large manufacturing district.

Mr. *H. A. Humphrey*, examined by Mr. R. WALLACE, K.C., sa'd there were no engineering difficulties in this scheme which were not capable of being successfully solved. The pressure in the pipes for the purposes of the Bill would not be more than from 7 to 10 lbs. per square inch. In America, they sometimes went up to 150 lbs. to the square inch. In South Staffordshire, they had settled upon a very suitable form of pipe. It was of steel, and was tested up to 300 lbs. per square inch; and a type of joint had been produced which ensured them against leakage. The saving by the use of power gas instead of coal or ordinary lighting gas was as much as 70 per cent. in some cases; and in addition there was the saving in the recovery of sulphate of ammonia from the slack. Many companies were using Mond gas according to the system named in the Bill. Messrs. Brunner, Mond, and Co., had plant near Northwich which was giving off about 37 million cubic feet of this gas per day, or much over a million feet for every hour of the day and night. Mond gas he might describe as a producer gas with a calorific value of about 150 British thermal-units per cubic foot. It was a fixed gas, and one that contained less carbon monoxide than most other producer gases. It was made from a cheap and abundant fuel. In manufacturing this gas, they recovered about four times the amount of ammonia from a ton of the coal used as was recovered from a ton of coal in ordinary gas-works. The value of the bye-product thus went a long way towards covering the original cost of the coal. It was more uniform in quality than other producer gases, owing to the system of gradually saturating the air at a fixed temperature. In the manufacture of the Mond gas, the tar was mostly destroyed and converted into fixed gas; and the resulting gas, when purified through the apparatus used in the Mond process, was sufficiently clean to be distributed through underground pipes without fear of blocking them up or depositing any residuum. In all industrial furnaces requiring high pressures, there would be a great saving from the use of gaseous fuel—40 to 70 per cent. There would be this further advantage from the use of gaseous fuel—that furnace heating would be more uniform, and when, by trial, the best conditions of working were ascertained, those conditions could be repeated with great precision, because the gas could be turned on in a constant stream of uniform quality. As compared with other engines, there was no time lost with the Mond gas in lighting fires and getting up heat. There would be no storage of coal except at the generating stations. The user of gas for power had only to turn a tap and he obtained his supply from the main. All these advantages represented a large money saving. The most scientific and the cheapest means of obtaining power from coal was found in the use of Mond gas in gas-engines. At no steam-engine station in the world had power been generated so cheaply as at Wirnington, where Mond gas was used to drive the largest gas-engines in the country. There was no competition with lighting gas in the Bill, because Mond gas was non-illuminant. It burned like spirits of wine, and could not be used for mantles.

Friday, May 8.

Mr. *Humphrey* was cross-examined this morning by Mr. ERNEST PAGE, on behalf of the opposing gas companies and others. He said that the gas used in America for power purposes was not Mond gas, but natural gas. Mond gas had been conveyed under pressure a distance of about three-quarters of a mile. As regarded radius, the promoters of the Bill would probably not take their gas beyond six miles from the generating stations. But the generating stations had been chosen specially with the view of the supply of electrical energy; and they could very conveniently couple with that the supply of power gas over the portions of the district which were fairly close—say, up to ten miles. Beyond that point, as the scheme developed, they hoped to establish additional stations for the supply of power gas. There were many places which, in the initial stages, the Company would not be able to supply with gas power but with electrical energy. In the South Staffordshire case, the area they obtained leave to supply was 123 miles; the capital being £1,333,000. In the present case, the capital was only £2,000,000; and the area was about 17½ times as large. The South Staffordshire works were not yet completed. It was hoped to start working them at the end of this year. He did not think a limit of time should be placed on their power to lay mains throughout the district. They were an electric supply Company, and intended to supply electricity as well as gas. As to dividend, they were entitled under the Bill to pay 10 per cent. on the undivided capital. The large consumers of the Company's gas would be charged 3d. per 1000 cubic feet, and the ordinary small class of consumers 4d. as a maximum. There was a tendency to reduce the candle power of illuminating gas; and down to a certain point, the lower the illuminating power the more cheaply could the gas be supplied. But it could

not be produced and distributed, even at no candle power, at less than 1s. 6d. per 1000 cubic feet.

Witness was also cross-examined by Mr. WEDDERBURN and other Counsel on behalf of the Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board and other bodies who opposed the Bill.

Mr. *H. E. Jones* and Mr. *S. Z. Ferranti* gave evidence in support of the gas and electrical power sides respectively of the scheme.

Monday, May 11.

Lord Aberdare was unable to attend this morning through indisposition; but it was unanimously agreed to proceed with the Bill in his Lordship's absence.

Mr. *Humphrey*, recalled, in answer to Mr. PAGE, said that the estimate in the Bill for works and mains was about £900 per square mile for the area to be covered. He knew that the cost in the South Staffordshire case was about £10,000 per square mile. The area under the Bill might be eleven times larger. He did not think that the case of South Staffordshire demonstrated that the capital asked to be sanctioned in the Bill was insufficient to supply the needs of the proposed area. The area was one in which they would supply a large number of manufacturers, who, being all close together, could be more easily supplied. The district was unlike that of South Staffordshire, which was largely an agricultural area. The cost of supplying both electricity and power gas under the Bill was estimated at much less than the cost of supplying power gas alone under the South Staffordshire scheme, or under the Bills for Lancashire and Yorkshire, which were for distribution of electrical power alone. The conditions of the areas were different. There was no present intention to carry the mains as far as Birkenhead or Wallasey. As to the definition of a dwelling house, to which they were not to supply lighting or power gas, he took it that the Grosvenor Hotel in Chester consumed 1,700,000 cubic feet of gas per year for heating purposes. He could not say that such a place would be legally interpreted as a dwelling house. Asked if he was willing that such places should be taken out of the powers of supplying gas for power under the Bill, witness said that was a question for the promoters and for Parliament.

Mr. *E. F. Lacey* said he considered the Bill was a good one—very suitable for a district where there were many industrial centres within which it was very desirable to have cheap electrical and gas motor power. The insulation of the Company's mains would be effected to the satisfaction of the requirements of the Board of Trade. For one of the generating stations, his estimate, including everything, amounted to £197,428.

Mr. *John Sturgeon* said he was largely responsible for the scheme—in fact, he was the originator of it. The combination of the manufacture of electric power and gas power would be very useful. In the Potteries district, power gas could be used with great advantage.

In cross-examination, witness said that at present they had only practical experience of distributing Mond gas over three-quarters of a mile; but it could be conveyed and distributed at a much greater distance from the generating stations. There were many works prepared to take their motive power from the Company as soon as it could be laid on. It was possible to produce Mond gas at Birkenhead.

COUNSEL: You were responsible for the scheme. Is it worth the paper it is written on?

Witness: Yes; it is. We could supply producer gas from our nearest proposed generating station to Birkenhead.

Witness went on to say that there was no difficulty in carrying gas to a distance of 300 to 400 miles; and Mond gas was more easily carried than any other gas. It would also be most useful in hilly districts, because it would save the heavy cost of carrying coal or other fuel in such areas.

Mr. *R. Threlfall*, of Oldbury, said he had manufactured Mond gas for two years for gas-engines and furnaces, and found it exceedingly serviceable. It was also cheap, and would do something to enable our traders better than at present to compete with foreign producers who had more natural water power than we had in England.

In cross-examination, witness said that at his works they produced over 2 million cubic feet of this gas per day. They found it cheaper than coal for steam-power; and it was remunerative to put down the plant for the purpose. It would pay to put down power gas plant even where only 50 or 60 horse power was required.

Mr. *H. Blundell*, the Chief Engineer to the Cheshire Lines Committee, said he was well acquainted with the area of supply proposed in the Bill. There were many large works in the district; but there was plenty room for further industrial development. It would be advantageous for any railway company to have cheap power, such as Mond gas and electricity.

Mr. *W. Douglas Phillipps*, the General Manager of the North Staffordshire Railway, concurred in the evidence of the previous witness.

Mr. *Willcox* also gave evidence in favour of the Mond gas for power purposes.

Several manufacturers were called, and expressed their belief that the introduction of Mond gas for power would be a great advantage to manufacturers and others in the area proposed.

Tuesday, May 12.

Lord Aberdare was still absent when the Committee met this morning.

Mr. *Twyford*, the Chairman of the promoters of the Bill, was the next witness. He anticipated great advantages from the introduction of power gas. In pottery and other works, it would effect a great saving in the cost of fuel, and would enable them in these industries to compete more successfully with foreign traders. He did not think the Bill would be in competition with the existing gas companies. Perhaps only half-a-dozen firms in the district would put down gas plant for power. From the proposed Company, they could get power gas on tap, which would be a great advantage. They would not get a monopoly under the Bill. If any other body came in and supplied cheaper and better power gas, they could be allowed to come in and compete with the promoters of the Bill.

Mr. *Lacey* was recalled, and stated that they proposed to instal about 7000-horse power at each of the generating stations. He thought this would be sufficient for economical distribution of electrical and gas power. The costs for everything before the supplying of electricity and gas would no doubt nearly use up the capital of £1,500,000 without the borrowing powers. But they hoped to begin supplying by the end of two years.

The remainder of the evidence for the promoters in support of the Bill went to show that traders and others in the district desired to have introduced the electrical and gas power proposed by the Bill. Other witnesses supported the Bill on the ground that it would give more efficient and cheaper motor power for their engines, either by electrical power or power gas.

Mr. PAGE opened the case for the fourteen Gas Companies opposing the Bill. These Companies had an absolute statutory obligation to provide gas, not only for illuminating purposes, but for other purposes, such as heating and power. His clients had a capital of £573,000; and they had hitherto performed their duties to the satisfaction of those who had been receiving gas from them. His Companies had 517 miles of mains, and supplied a great quantity of illuminating gas. Some of them had already suffered from competition with electric light; and they all feared that they might suffer still more from it under this scheme. They had therefore looked about for new consumers and new methods for which their gas might be used; and they had applied themselves to the question of whether or not they could make up with electric competition by supplying gas for heat and power. It was now a fact that one-third of the gas which his clients supplied was used for heating and power; and as newer processes had been introduced, they would be able to supply heating and power gas at a lower rate than hitherto. He believed he would be able to prove that it would soon be possible to supply ordinary gas for heating and power purposes at 1s. 3d. per 1000 cubic feet. Hitherto the gas companies had had to face the competition of electricity only; but under the Bill there would be competition from electricity and gas combined. He hoped the Committee would not create such a precedent. They should wait to see whether the South Staffordshire Mond gas scheme proved successful, and leave to a future Committee to decide whether this new and more extensive scheme should be sanctioned. He therefore asked the Committee to reject the Bill.

Mr. *Charles Hunt* was the first witness called for the petitioning Gas Companies. He said the cost of carrying gas over very long distances was still a matter entirely in the dark; but even now every gas company was supplying more or less gas for heating and power. The modern improvements in fittings and mantles were reducing the necessity for producing high-power illuminating gas. The cost therefore of making the gas would be reduced, and the ability of the present companies to supply gas for heat and power would be increased.

Mr. *Corbet Woodall* said special and unusual privileges were being asked from Parliament by the Bill, and, in present circumstances, he thought they were not justified. The area asked was too large, and should not be granted to one company. Even the proposed areas from each generating station were too large. The diminution of the cost of the production and distribution of illuminating gas had led the gas companies to direct more attention to the supply of gas for heat and power than formerly.

In cross-examination, witness said that the evidence justified a trial of the distribution of Mond gas, but he objected to the Bill, because it proposed to take over a very large area when the smaller area in South Staffordshire had not yet been tested practically. He had had no experience of the use of Mond gas. He did not object to gas being used to generate electrical energy. If they succeeded in establishing cheap power, no doubt industries would spring up in the neighbourhoods where it was established. His opposition to the Bill was as much in the public interests as in that of the gas companies. The opposition of the British Gas Company to the Bill was withdrawn under a misunderstanding.

Wednesday, May 13.

Mr. *Hubert Pooley*, the Engineer of the Stafford Gas-Works, gave evidence in support of the Gas Companies' petitions against the Bill. He said his Corporation supplied a large quantity of gas for power purposes at a moderate charge. There was a fear from competition by this new Company. He thought the capital of the new concern was not sufficient to enable them to come to Stafford. Their supply would be exhausted before it could reach Stafford. His works had had no difficulty in supplying all the power gas required in the district.

Mr. *James Pye*, the Secretary of the Chester Gas Company, said the hotels and large establishments in the district used electricity for lighting, and gas for heating, cooking, and power purposes. The Bill might take from the existing Gas Companies their sole source of development in the direction of supplying gas for power.

Mr. *A. Gill*, the Town Clerk of Birkenhead, said his Corporation owned both the gas and the electricity supply; and they objected to the promoters having powers in their district, and so competing with them. He also maintained that the promoters had no intention of bringing gas to Birkenhead, and that to give them statutory powers to do so would prevent the Corporation at any future time sanctioning the supply of such gas to any other parties. He also stated that none of the generating stations proposed by the Company could supply anything like the quantity of current that the Corporation would be able themselves to supply in a few weeks time. Apart from the cost of distribution, electricity cost about ¾d. per unit, and it could be sold at about 1½d. per unit. The streets of the borough were so full of pipes and tunnels that there was no room for any more pipes. He could not understand the Bill, which he thought was unworkable in its clauses. He had no doubt that Mond gas might be provided for power without smoke or smell; and therefore its use would not affect a residential area like Birkenhead.

Mr. *James M'Gaul*, the Chairman of the Birkenhead Corporation Electricity Committee, said the Corporation had spent £220,000 on generating stations for electricity. They had installed 4000-horse power,

and had room for 3300-horse power more. The Corporation had done all that was needed to meet the requirements of the borough. They generated 2,494,000 units last year for tramways, power, and lighting. They supplied current for lighting at 3½d. per unit. For power, they supplied it at 2½d. up to 500 units, at 2d. up to 1500 units, and above that limit the charge was 1½d. They had been able to supply all the demands made upon them; and from his experience of the Corporation's electrical works, he saw no good from the promoters being allowed to compete with them in their area.

Sir R. LITTLER then addressed the Committee on behalf of the Birkenhead Corporation against the Bill, which he declared would be a direct injury to the ratepayers. He therefore asked that Birkenhead should be excluded from the Bill.

Mr. HONORATUS LLOYD addressed the Committee for the Corporation of Stockport, and claimed that Stockport should be excluded. He maintained that the Company could not supply the needs of the districts for many years to come with electricity and gas power. The capital was wholly insufficient to enable them to supply such energy over that great area.

Mr. *R. Hyde*, the Town Clerk of Stockport, gave evidence against the Bill so far as it applied to that borough. The Corporation had had the right to supply gas since 1837, and had power to supply gas for lighting and power within their area, without any restriction of the illuminating power. Mond gas could be supplied by his Corporation if there was a demand for it in the district; and it would be better it should be supplied by the Corporation than by a Power Company.

Mr. *Thomas Webb*, the Chairman of the Stockport Corporation Electricity Committee, said the Corporation had installed sufficient plant to provide electricity for the whole of their district, and had been able to supply it at so low a price as ¾d. per unit.

Mr. *S. Meunier*, the Gas Engineer to the Corporation of Stockport, also gave evidence.

Thursday, May 14.

Mr. THESIGER said he represented two sets of petitioners—twelve Urban District Councils, and five or six Rural District Councils in Cheshire. Most of them had power to supply electricity and gas in their own areas, and they opposed the Bill because they considered that a combination of powers—electricity and gas—in the hands of one company was undesirable. Another of their objections was that the distribution of Mond gas was in an experimental state, and it was yet to be seen whether it could be distributed in the manner suggested in the Bill. They also contended that the huge area over which powers were to be taken under the Bill could not be adequately supplied, while the Bill would create a monopoly for the proposed Company in this huge area for all time.

Counsel called no evidence for the petitioners whom he represented.

Mr. PRITCHARD addressed the Committee on behalf of the Corporations of seven towns within the proposed area. He submitted that no public advantage would be served by the Bill, and that the scheme was unworkable owing to the great extent of the area, and the insufficiency of the capital proposed to be employed. All the towns he represented were authorized to supply electrical energy, and they were willing and able to supply it. They objected to electricity and gas supply being put into the hands of one Company; for electricity and gas were competing agencies for light and power, and ought to be left to compete against each other to the benefit of the public. In regard to Macclesfield, if the Company undertook to come in at once, or within a reasonable time, the Corporation might not be inclined—though they had power—to put down generating stations at great cost for themselves.

Counsel for the Hanley Corporation, for the Altrincham Gas Company, for the Corporation of Manchester, and for the Dukinfield, Stalybridge, Mossley, and Hyde Tramways and Electricity Board also addressed the Committee against the Bill.

Mr. *A. H. Gibbings*, the Engineer-in-Chief to the latter Board, was then examined. He said that the object of the formation of the Board was to obtain all the advantages of economy from supplying power from one generating station.

Other witnesses were called and gave evidence against the Bill on the part of several more corporations and councils within the proposed area of supply.

Mr. RAM, addressing the Committee, maintained that the capital proposed to be raised under the Bill would be absolutely insufficient to instal a proper electrical and gas power in this enormous area. But the promoters desired to enter into possession of the area so as to sell it in sections to other bodies who would supply in portions of the area.

Friday, May 15.

Mr. BALFOUR BROWNE to-day addressed the Committee on behalf of the promoters. He complained that, in attempting to prevent the Company getting the powers they were asking, the petitioning corporations and district councils and gas companies were seeking to injure the traders of this country in their competition with traders in other countries. Therefore, the issue was important even beyond any interests of the promoters of the Bill. He thought that all the local authorities and bodies were taking up a position that was not only unpatriotic but shortsighted. The promoters were before Parliament for only one object; and that was for leave to break up the streets and roads, to lay pipes over a great district, in order to supply that which they had a right to produce. The promoters had the right to manufacture electricity and to manufacture Mond gas to supply the engines which produced the electricity. It was a cheaper method than the production of electricity direct by means of coal and steam power. The Company could produce electrical and gas power more cheaply than the corporations could do it. Large manufacturers could generate power for themselves, but the small traders could not do so; and this was a Bill in relief of the small or medium trader or manufacturer, who were after all the majority, rather than in relief of the great firms. The largest gas company in the whole area proposed to be taken was the British Gaslight Company, of which Mr. Corbet Woodall was a Director. He was always a fair witness, and never made a wrong statement consciously. He admitted that if the traders could get Mond gas at 2d. per 1000 cubic feet or perhaps a little more, it would be an advantage in some cases, because it would be supplied at a price lower than the price at which the gas companies could supply it.

The Committee having deliberated in private,

The CHAIRMAN announced that the Committee held that the preamble of the Bill had been proved, subject to certain reservations. The Committee had decided to grant to the promoters the whole of the area which they asked to supply, and would not exclude the various towns and boroughs who had petitioned to be excluded from the operation of the Bill. But they considered that the Bill should be limited to Mond gas and electricity; and the expression "power gas means any power gas approved by the Board of Trade" should be limited to the gas of this particular inventor. Then sanction was asked to enable the Company to let or dispose of so much of the land which the Company were to acquire for works and stations which they might not require to use. The Committee did not think that land acquired under compulsory powers should carry the right to the promoters of the scheme to sell it to any other persons; and therefore they would not give the Company this power to sell it to other persons. Clause 23 of the Bill referred to electrical energy supplied for power, but not to be used for lighting purposes. The words of the clause, however, might enable a large hotel, using the Company's supply for power, to use it also for lighting; and against this the Committee would put in a clause as in the Somerset Bill the previous week. The Committee would refuse the clause giving the Company power to lend money; and as to the time for the construction of the works, the Committee thought it should be made quite clear that the time allowed would be four years from the 1st of January, 1904.

It was then arranged that the adjustment of clauses should be proceeded with as yesterday (Monday).

HOUSE OF LORDS COMMITTEE.

May 8, 11, and 12.

(*Before Lord* NEWTON, *Chairman, the Earl of* ROMNEY, *Viscount* BARRINGTON, *Lord* SANDHURST, *and Lord* HYLTON.)

HOVE, WORTHING, AND DISTRICT TRAMWAYS BILL.

This was a Bill to enable the British Electric Traction Company to equip electrically an existing horse tramway belonging to them, extending from the borough of Hove to New Shoreham, and to construct a tramway onwards towards (and possibly into) Worthing. Among the opponents were the Brighton and Hove Gas Company, who, in their petition, stated that they were advised that if the Bill was passed and the tramways and other works therein described constructed, very serious damage would be caused by the electricity for working the tramways to their mains and services which lay under and in the roads along which the existing tramway was laid; and, in the event of an escape of electric current from the mains of the promoters, the petitioners' gas-mains would be destroyed and damaged. They said the whole of the gas supply of the district was dependent upon them; and they urgently called attention to the very grave results which would or might arise from an escape of gas from their mains. They also alleged that there was no provision in the Bill for the payment of any compensation for damage arising from fusion or electrolytic action.

Mr. HONORATUS LLOYD, who appeared for the promoters, said this was a case of their old friend, the dread of electrolytic action on the part of a gas company. It had been discussed over and over again; and the result had been that a perfectly well-known set of clauses had been brought into existence to protect gas and water companies. All these clauses were included in the Bill. The Court of Referees in the House of Commons had recently refused *locus standi* to a gas and a water company, both of whom had been desirous of raising the question again. The practice of Parliament was now perfectly well established; and he therefore asked the Committee to say that the Gas Company were not entitled to be heard against the Bill at all.

Some discussion took place; and it was understood that the matter of electrolysis would not be dealt with until the clauses were reached.

Mr. *Stephen Sellon*, Chief Engineer to the British Electric Traction Company, gave evidence in support of the scheme.

In cross-examination by Mr. A. M. PADDON, who appeared for the Gas Company, he said that after reconstruction the loads on the tramways would be heavier; but when reconstructed for the purpose of electrical working, there must be a bed of concrete of considerable thickness underneath the rails, and the rails must be very much heavier, so that the disturbance of gas-pipes would be no more than with an ordinary tramway. He wished to have the same protection in regard to the old tramways when reconstructed as he would have if they were new. He (witness) was under the impression that he would have absolutely the same powers, because the Bill incorporated the Tramways Act of 1870, which had a special gas and water provision. Asked whether he had any objection to say definitely that the clause of the Act of 1870 should apply to the reconstruction, he said his view was that the Gas Company were absolutely protected by statute; and he could not agree to go beyond that.

The CHAIRMAN: Supposing the preamble is proved, I think, Mr. Paddon, you may take it for granted that the Gas Company will get the protection which gas companies usually obtain.

In further cross-examination, witness held that the promoters had no power to lay any mains or cables along a private road of which the Gas Company were the owners.

Mr. PADDON: In the case of the Brighton Corporation Act of 1900, we were given special protection. If it was necessary in that case, do you not think it is necessary in yours?

Witness: I do not think it is at all. If you can show us you are not protected, we will give you protection.

The evidence having been concluded,

Mr. PADDON addressed the Committee, stating that only one point of the Gas Company's opposition remained to be dealt with on preamble. This affected the Company as freeholders of a road running in front of their property. In clause 5 of the Bill, large powers were proposed, in the event of the promoters taking electricity in bulk, to lay mains; and these powers would give them authority over the roadway, which had been constructed in great part by the Gas Company, was used almost exclusively for the purposes of the Company, contained their large arterial mains, and was therefore a most vital point in their distributing system. In the Act of 1900 of the Brighton Corporation, a clause was inserted for the protection of the Gas Company; and a similar clause was all they asked on this occasion.

Mr. HONORATUS LLOYD, in reply, said the present being a Tramway Bill, the Tramways Act was incorporated; and thus the Gas Company obtained the protection of that Act. But the Brighton Act related to electric lighting; and therefore the Tramways Act was not incorporated, and a special clause was needed. If the road in question were private, the promoters would have no power to interfere with it.

The CHAIRMAN, in announcing the decision of the Committee, said they found the preamble proved on certain conditions, one of which was that the clause asked for by the Gas Company for their protection should be given.

After an adjournment for a conference between the parties,

Mr. HONORATUS LLOYD said the Gas Company had presented a clause which the promoters could not accept; and the matter would therefore have to be discussed before the Committee. The point had been discussed over and over again in recent years; and he thought he was right in saying that the protection desired had been invariably refused. On two occasions, however, a clause similar in effect to that proposed had been inserted in Bills; but in one of these it was put in the Bill in one House and struck out in the other. Since then the Chairman of Committees in the House of Lords had struck the clause out of Bills when he found it inserted; while in the other House a gas company petitioning to be heard in favour of such a clause had been refused *locus standi*, on the ground that the model clauses were sufficient to protect the company. These model clauses (which were embodied in the present Bill) had been prepared in accordance with the decision of the Joint Committee which had sat to consider the subject; and their purpose was to enable the Board of Trade to make regulations. The model clauses said that the company using the electricity should not, in constructing and working their lines, injure by fusion or electrolytic action the pipes of water and gas companies; and that the electrical power should be used only in accordance with the Board of Trade regulations.

Mr. PADDON contended that the regulations of the Board of Trade were not sufficient for the purpose for which they were designed. The clause that had been inserted in the Sheffield Act was to the effect that, notwithstanding anything contained in the statute or the promoters' previous Acts, if it were proved that injury or damage to any of the main-pipes of the Gas Company had resulted from fusion or electrolytic action caused by the current used for electric traction on any of the tramways, nothing in the said Acts or the present Act should relieve the promoters from liability to make compensation for the damage. He submitted that the electrolytic action for which he wanted to make provision was cumulative.

The CHAIRMAN said he was surprised that the matter had not been settled before this. There had been any number of Tramway Bills passed in recent years without a special clause of this description.

Mr. PADDON said that the action which damaged the apparatus of the Gas Company was a very slow one; and it was difficult to accumulate evidence. But though slow, it was none the less sure. The Tramway Company wished to close the matter so far as special protection was concerned; but the Gas Company wanted to keep it open.

The CHAIRMAN said that when the Committee agreed to give the Gas Company a special clause, they understood the Company were being worse treated than gas companies usually were, and that the safeguards under the Bill were not so good as was generally the case.

Mr. PADDON said the Gas Company asked for nothing unless actual damage was proved.

The CHAIRMAN: Do you take your clause from the Sheffield Act?

Mr. PADDON: No; ours is more moderate than that. We practically say that if damage is done, nothing in the promoters' Acts shall relieve them from liability to pay compensation.

Mr. *Sellon* was re-called, and gave a history of the model clause—clause 33 in the Bill—which he said put the tramway companies under the Board of Trade and involved them in considerable expenditure. It was necessary to expend £1000 a mile to provide against electrolytic action. The Board of Trade regulations were very detailed. If these regulations were insufficient, it rested with the Board of Trade to make them sufficient. A protective clause had been put into a Bill of the London United Company by agreement. Another had been put in the London County Council Bill dealing with the tramways on the conduit system; but in that case there was a metallic return, and the Board of Trade regulations would not apply. These instances were in addition to the Sheffield case. He himself had been engaged in fifteen schemes, in all of which what was now asked for had been refused. Electrolytic action had never been proved before any of these Committees. The report of the Joint Committee had never been upset.

In cross-examination, witness said it was already difficult to finance tramway undertakings; and to pass the proposed clause would be to impose on them something which ordinary financiers would not like to look at.

Mr. PADDON said the promoters wished to put the Gas Company outside the pale of the common law. If injury were done to the gas-mains, they would say: "We did our best for you; we are sorry for what has happened." And the Company would get nothing else.

The Committee, after a brief deliberation, decided to refuse the Gas Company the clause they asked for. They found they had been mistaken in supposing that the petitioners would be placed in a worse position than that usually occupied by other gas companies.

When the clauses were being adjusted, Mr. Lloyd stated that a clause, in accordance with the decision of the Committee, had been agreed to.

LEGAL INTELLIGENCE.

A Heavy Penalty for Stealing Gas.

At the Rugby Police Court, last Tuesday, John Hadley, proprietor of the Holly Bush Inn, New Bilton, was charged with fraudulently abstracting gas from the mains of the Rugby Gas Company. Mr. Wratislaw, who prosecuted, said the defendant, who was now an old man in feeble health, was formerly a brazier; and he had made the connections with the gas-mains with much cleverness. Recently when the Inspector examined the meter, he found there had been a considerable increase in the quantity of gas recorded as compared with previous years. His suspicions were therefore aroused, and, in company with the Company's Engineer (Mr. C. Meiklejohn) he made a further inspection. It was then found that, although the house was lighted up and a hot-water apparatus on the counter was in working order, the inlet and outlet taps of the meter were closed; and a search revealed the arrangement of pipes by which gas was procured without passing through the meter. Defendant had always regulated the quantity he allowed to pass through the meter in accordance with the time of year, so as to avoid suspicion; and it was supposed that the fraud had been going on for twenty years, during which time the Company had lost about £10 per annum. The fraud was only discovered when, through illness, defendant could not regulate the supply; the last quarter's consumption being something like 4000 cubic feet in advance of the same period of the previous year. In consequence of defendant's frail condition (he being 70 years old), the Company stated their willingness to consent to a fine of £5 and £5 costs, and £2 a day for the last thirty days—amounting altogether to £70. Two other charges were withdrawn.

Claim by a Day Labourer.

At the Lambeth County Court, last Tuesday, before his Honour Judge Emden, William Barrett summoned the Southwark and Vauxhall Water Company for 24s.; being one week's wages in lieu of notice. Mr. Wells, who appeared for the Company, explained that though the sum in dispute was small, an important question was involved, not only to water companies, but to many employers of labour. Plaintiff was an engine-fitters' labourer engaged by the day; but as he was paid weekly, his Union had laid it down that he was entitled to a week's notice. Water companies had their busy and slack seasons, and they would be greatly hampered by an adverse decision in this case. It was really a test summons, and if it was successful many other men would sue. Plaintiff was called, and said he was engaged at 24s. a week, and was paid weekly. He contended that if he and other labourers were hired by the day, a notice should be posted in the office to this effect. In cross-examination, he admitted the accuracy of time-sheets, which showed that in some weeks he had been paid only 16s. and 20s., while in others, when he did Sunday work, he received 28s. Two witnesses for the Company deposed that the man was engaged by the day. His Honour said he had not the slightest hesitation in holding that the fact of a man being paid weekly did not change a daily engagement into a weekly one. The case was accordingly dismissed. No costs were asked for by the Company.

Cost of Gas and Meter Testing in the Metropolis.—The Finance Committee of the London County Council presented their annual estimates for the year ending March 31, 1904, at the meeting of the Council last Tuesday. Among the various estimates approved were the following items of revenue: Gas-testing expenses recoverable from gas companies, £200, being a decrease of £7 from the actual receipts of last year; meter-testing fees, £6750, being an increase of £857. The estimated expenditure was: Salaries for gas examiners, stores, and incidental expenses, £4130, being an increase of £308; and salaries and wages, rent, rates, repairs, &c., of meter-testing offices, stores, and incidental expenses, £11,045—an increase of £3821.

Aberavon Gas Supply.—After years of adverse trading, the accounts of the Aberavon Corporation gas undertaking to March last promise to be the best in the history of the old works. The Manager (Mr. A. Bond) had the good fortune to report to the Gas Committee at their last meeting that not only had a saving of upwards of £500 been effected in the coal purchased, but that the rentals had gone up considerably more than this. The gas made was 26,829,200 cubic feet, which was 1,144,200 cubic feet in excess of the quantity produced the previous year. The increased sales were 2,667,100 cubic feet; showing that under Mr. Bond's supervision the leakage has been reduced practically to the ordinary figure. These results could be still further improved if the Town Council proceeded with their scheme for new works, as the Manager is greatly handicapped by the antiquated plant at his disposal. For once it can be said that the undertaking has been sufficiently profitable to meet the interest and the annual repayment on capital account.

Sales of Stocks and Shares.—At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards sold, by order of the Directors, £12,500 of additional "B" consolidated stock of the Tottenham and Edmonton Gas Company, ranking for a standard dividend of 3½ per cent., subject to the sliding-scale; the last dividend on the existing "B" capital having been at the rate of 4½ per cent. per annum. It fetched prices ranging from £101 to £101 10s. per £100 of stock. On the same occasion, he placed, also by order of the Directors, some £10 ordinary shares of the Great Yarmouth Water Company (last dividend 4 per cent.) at £10 and £10 2s. 6d. apiece; and some 4 per cent. perpetual debenture stock at £103 and £104 per cent. Mr. T. H. Church has just sold by auction £184 17s. 6d. of "A" stock in the East Grinstead Gas and Water Company for £331 10s. The last dividend on this stock was at the rate of 8 per cent. At a local sale last Wednesday, 17 £20 fully paid "C" shares in the Northampton Gas Company realized £33 5s. and £33 each.

MISCELLANEOUS NEWS.

COST OF STREET LIGHTING AT BRADFORD.

The Contribution from the Rates.

The decision of the Finance Committee of the Bradford Corporation, that a sum of only £21,000 should be provided out of the general district rate for the current financial year as a contribution towards the cost of street lighting by gas (instead of the £31,000 asked for by the Gas Committee), has not been allowed to pass unchallenged. At last week's meeting of the City Council, Mr. James Freeman, the former Chairman of the Gas Committee, pointed out that they had adopted the principle that the street lighting should be paid for by the ratepayers generally, and not by the gas consumers; and he urged that they ought to be consistent. He therefore moved that the Finance Committee be requested to alter their decision, and pay the whole estimated cost (£31,000), instead of a contribution of £21,000, which was simply begging the question. Mr. Guy said that if this course was adopted, it would mean an increase of 2d. on the rates. Alderman Irvine Hind remarked that, as Chairman of the Gas Committee, he felt bound to vote for Mr. Freeman's amendment. There was no large municipality in the country who made the gas undertaking liable for the cost of street lighting. Alderman Toothill expressed curiosity as to how the sum of £31,000 was arrived at. It seemed to him that the gas undertaking had got into a deplorable state, and they now wanted the Council to help them out. He thought a Special Committee ought to be appointed to inquire into the reason why a good concern like the gas-works had been losing money of late. Mr. E. J. Smith said it was decided last year that an "agreed sum" should be contributed towards the cost of street lighting; and the gas consumers profited by a reduction of the price of gas by 3d. per 1000 cubic feet. Such a sum (£21,000) had now been arrived at by the Finance and General Purposes Committee, which represented the Gas Committee and every other Committee. Mr. J. Hayhurst pointed out that, owing to the big rise in the price of coal and the injudicious reduction in the price of gas, together with the expense incurred in acquiring gas-works in the out districts, there would this year be no profit on the gas undertaking. If £21,000 towards the street lighting was allocated from the rates, and the Gas Committee were made to pay the remainder, he hoped it would be recognized that the whole Council would be responsible for the paying away of Gas Committee funds. As a member of the Committee, he should vote for the amendment. Mr. J. A. Godwin, the Chairman of the Finance Committee, in replying to the discussion, drew attention to the fact that the resolution last year was worded so as to deal with varying circumstances at different times. If the Gas Committee received out of the city funds £31,000, they would be expected to reduce the price of gas in proportion; but he understood that, so far from this being possible, there would actually be no profit at all on the undertaking. The Finance Committee could not depart from the principle that the consumers of gas should benefit from the contribution out of the rates, as they did last year; and as the Gas Committee could not further reduce the price of gas, it was felt that the contribution of £21,000 was ample for the present. Next year, if it should happen that the Gas Committee would be able to make a corresponding reduction, the Finance Committee might vote the additional amount towards the cost of street lighting. This question was bandied about last year; and it was evidently meeting with the same fate now. The amendment was defeated by 35 votes to 26; and the minutes of the Finance Committee in their original form were then carried.

SOUTHPORT CORPORATION GAS SUPPLY.

The Engineer's Annual Report.

We have received from the Gas Engineer and Manager of the Southport Corporation (Mr. John Booth) his report on the working of the gas undertaking in the twelve months ending the 31st of March. He begins by referring to the granting by Parliament, on July 22, 1902, of the Provisional Order by which (among other things) the illuminating power of the gas was reduced to 16 candles, or "such other equivalent light," and produced in such manner, as the Board of Trade might from time to time approve, to be tested by the table photometer and the pentane lamp of the respective patterns and in the manner set out in the Notification of the Metropolitan Gas Referees. The reduction in the candle power came into force at the close of the December quarter; and simultaneously the price was lowered in the borough to 2s. 8d. per 1000 cubic feet, and outside to 3s. 2d. The gas-making material used was: Cannel, 550 tons; coal, 35,439 tons; oil, 1545 tons; coke, 1128 tons. There was a decrease of 1084 tons in the quantity of cannel used, and increases of 1249 tons, 530 tons, and 31 tons in the other materials, compared with the year 1901-2. The make of gas was 428,280,000 cubic feet—practically the same as before. The quantity sold was: Private consumers, 381,248,900 cubic feet (17,000,900 feet being prepayment supplies); and private and public lighting, 29,850,100 cubic feet. In the works and offices 2,141,000 cubic feet were used; and 547,300 cubic feet of free gas were supplied. The quantity unaccounted for was 3·38 per cent. The gross profit realized was £22,235 13s., and the net profit £10,086 8s. 2d.; being increases of £2766 and £2163 respectively on the preceding year. The profits were affected by the reading of the meters six days earlier than last year, which was estimated to have made a difference of 6 million cubic feet of gas, valued at £750, and by the increased expenditure amounting to about £1000. The Engineer's estimate of the net profit for the year was £9000. The Gas Committee agreed to contribute for the year the sum of £8000 towards the relief of rates; and there was a debit balance on the net revenue account of £1919 4s. 1d.—the accumulation of two years' deficiencies in the anticipated profits. The past year's profit, therefore, in addition to paying the ear-marked amount, clears off the debit named, and leaves £167 4s. 1d. to carry forward. The capital account at the end of the year stood at £265,385 14s. 1d. (the expenditure during the twelve months having been £2289 4s. 6d.); and the gas-works debt, after deducting payments made through the sinking fund, at £206,780. This sum was apportioned as follows: 3 per cent. stock, £93,080; 3½ per cent. stock, £5000; and loans, £108,700.

At the Meeting of the Southport Town Council last Tuesday, Mr. Trounson, the Chairman of the Gas Committee, in moving the adoption of their minutes, said £604 had been spent in connection with the Local Government Board inquiry, and the opinions by Mr. Corbet Woodall. The amount of unaccounted-for gas in the past year was 14 million cubic feet. This was explained in connection with the six days' reading of the meters, for which gas they had not been paid. If they deducted 6 million feet for the six days, the amount corresponded pretty nearly with last year. The average loss was thus 1 96 instead of 3·38 per cent., compared with an average throughout the country of 5 per cent. Mr. Baker said he was disappointed with the result of the mechanical stoking; but Alderman Isherwood and Mr. Trounson pointed out that there had been a considerable saving effected since these stokers were introduced. Mr. Saul remarked that up to March, 1903, £15,307 had been expended on gas-cookers, and the total income for last year was £1754, or 11¾ per cent. He wanted to know if this would repay the interest. Mr. Trounson, replying to several questions, said he did not want the idea to get abroad that carburetted gas was not so good for cooking as ordinary coal gas. Professor Lewes had stated that when the heat of the gas came into direct contact with the object, the loss was so small that they could not appreciate it. The minutes were passed.

CHEAPER GAS FOR ROCHDALE.

The Rochdale Gas Committee, having considered the question of reducing the price of gas, recommended the Council to order that, after the next quarterly inspection of meters, the charge should be reduced as follows: Within the borough, for lighting purposes from 3s. 2d. to 2s. 10d. per 1000 cubic feet, and for other purposes from 2s. 3d. to 2s. (net). Outside the borough, for lighting purposes from 3s. 5d. to 3s. 1d. per 1000 cubic feet, and for purposes other than lighting from 2s. 9d. to 2s. 3d. (net). The scale of discounts for lighting within and outside the borough to remain as at present; and consumers by prepaid meters to be charged 1d. per 25 cubic feet, instead of 20. At the meeting of the Town Council on the 7th inst., Alderman Petrie, the Chairman of the Committee, explained what it was thought would be the effect of this proposal. He took it that they were all very pleased with the result of the year's operations of the gas-works. Now, the Committee were both willing and anxious to return to the normal price of gas. In fact, their proposal was not only to take off what was added on account of the high price of fuel, but even rather more than that, and so leave the price lower than it had ever been before in Rochdale. The estimated result of taking 4d. off the price was that it would cost £7500. The profits during last year were £12,800, in round figures; and there was a sum of £2500 which was graciously given from the reserve fund. These amounts added together gave £15,300. Taking from this the £7500 already mentioned, a profit was left—all things being equal—of £7800; and this was, they considered, a reasonable amount of profit for the works to enjoy. He might say that the Committee were unanimous in their recommendation; and he hoped the Council would be the same. There were considerations which would make it probable that the estimate of profits would be exceeded. The cheaper the gas, the larger the consumption would be; and he hoped the people of Rochdale would not be afraid to use the illuminant of the town. Mr. Taylor suggested that it would be much better to increase the illuminating power than to reduce the price; while Mr. Eastwood drew attention to the difference in the charge to prepayment and ordinary consumers. Alderman Petrie pointed out that the tendency of the present time was rather to reduce the candle power of gas, owing to the increase in the use of incandescent mantles. He was glad the penny-in-the-slot consumers had been mentioned. Giving through these meters 25 cubic feet instead of 20 feet, was really a reduction of 10d. per 1000 cubic feet. Mr. Clark remarked that they were all undoubtedly pleased to receive the statement of Alderman Petrie; but he for one considered that a still further reduction could be made. He found that during the last ten years the gas consumers had paid £92,945 in reduction of the rates, and that in the same period they had paid about £45,000 for the lighting of the streets. He considered that on this account the reduction should be a very substantial one. He further argued that the Corporation ought to supply the public at as near cost price as possible. He moved that the minutes be referred back, with an instruction that the Committee consider the advisability of reducing the price of gas for consumers in the borough for lighting purposes by 6d. instead of 4d. per 1000 cubic feet. The amendment, however, found no seconder, and therefore fell through. Mr. Sharp expressed his agreement in the main with Mr. Clark. He had been in favour of a 6d. reduction in Committee, but one of 4d. was arrived at as a compromise. He held that the profits from the Gas Department were too large, and that it was as right for the Health Committee to have coke free of charge as that the streets should be lighted at the expense of the gas-works. He pointed out that the penny-in-the-slot customers had been paying 4s. 2d. per 1000 cubic feet, and last year the receipts from this source amounted to £1766. He also observed that even the amended charge was 8d. more than that in certain other towns, but thought that the medium position now taken would be acceptable to the Council. Mr. Hoyle said he associated himself with Mr. Sharp's remarks; but he felt that half a loaf was better than no bread. He complained, however, that the factories were getting a higher discount than the ordinary gas

consumers. These factories only required gas during about four months of the year; whereas they had to maintain a plant capable of meeting the maximum demand. He considered that the millowners ought to pay more on this account. Mr. Ogden desired it to be known that there were other members of the Gas Committee who were favourable to a 6d. reduction. The Committee did not pocket the profits. A further reduction might be made; and it was for some other department to show that they could carry a 5d. rate for street lighting. Alderman Petrie, replying to the discussion, maintained that it was a natural thing to allow a larger discount to the consumers who took a big quantity. The fact that they had to keep a large plant to meet the demands of the factories had to be taken into account in connection with Mr. Sharp's remark that other towns supplied gas cheaper than they did. The extra capital outlay he regarded as a small matter. The Borough Treasurer informed him that the number of consumers in cottages who during the June to September quarter had gas accounts of under 1s. was materially over 1000. The Committee's minutes were then confirmed.

MIDDLETON CORPORATION GAS SUPPLY.

The Engineer's Report.

We have received from the Gas Engineer of the Middleton Corporation (Mr. E. E. J. Anderson) his report and working statement for the year ending the 31st of March. In the account of the proceedings at the meeting of the Town Council at which the report of the Gas Committee was presented (*ante*, p. 392), it was shown that there had been a total loss of £962. This, however, was considerably less than in the year 1901-2, when it was £3715; and if the same allowance had been made for retort renewals, it would have been £4275, or a difference of £3313. As remarked by the Chairman (Mr. Mills), in moving the adoption of the report, this, though a disappointment to the Committee, was not so bad; and a further explanation is afforded by Mr. Anderson. He points out that, though the revenue account for last year showed the adverse balance of £962, there was a credit of £1250 standing in retorts, £850 of which was provided in the twelve months, whereas previously a sum of only £300 was set aside, and before that only £100. Consequently, if provision had been made in due time, there would have been a deficit of only £112, or a net difference of £3913 on the two years' working. Taking full credit for stock, there would, in fact, have been a profit of £187. Mr. Anderson's working statement shows that 10,298 tons of screened coal and 7280 gallons of benzol were employed in the manufacture of 117,017,000 cubic feet of gas, or at the rate of 11,363 cubic feet per ton, against 10,025 cubic feet per ton before, the quantity sold being at the rate of 10,306 cubic feet per ton, compared with 9185 cubic feet in 1901-2. There was a considerable increase in the bulk of gas sold through prepayment meters—from 3,223,300 to 4,913,200 cubic feet. Another good feature in the past year's working was a return of 51·97 per cent. of the cost of coal by the sale of residuals, against 22·95 per cent. before. On the whole, the Chairman of the Committee had good grounds for the tribute which, as we learn from a local paper, he paid to Mr. Anderson, who, he said, had shown that he was doing the best he could for the undertaking.

WIGAN CORPORATION GAS SUPPLY.

The Engineer's Report.

In the opening sentence of the report of the proceedings at the recent meeting of the Wigan Corporation, given in the "JOURNAL" last Tuesday, emphasis was laid by the Chairman of the Gas Committee (Alderman Holmes) upon the fact that the amount of profit realized by the gas undertaking in the past financial year was equal to a rate of 1s. 3d. in the pound, and that it was the result of the excellent management of the Engineer (Mr. J. Timmins) and his staff.

The quantity of coal and cannel carbonized in the twelve months ending March 31 was 36,847 tons, being an increase of 1177 tons 10 cwt., or 3·58 per cent., on the bulk used in 1901-2. The gas made was 418,516,000 cubic feet, of which 386,139,900 cubic feet were sold and supplied for public lighting within the borough; being increases at the respective rates of 3 68 and 3·33 per cent. per annum. The consumption by slot meters (included in the above figures) was 11,900,400 cubic feet, compared with 6,169,800 cubic feet before; being an augmentation to the extent of 5,730,600 cubic feet, or 92·88 per cent. At the beginning of the year there were on the register 11,096 consumers by ordinary, and 1024 consumers by slot meters; whereas at the end of the year the figures were 11,632 and 1799—giving an increase of ordinary consumers of 536, or 4·83 per cent., and of slot consumers of 775, or 75·68 per cent. The total increase in the number of consumers for the year was 1311, or 10·82 per cent. The number of gas cookers on the register at the beginning of the year was 1447, and at the end of the year 1667. The number of gas engines on the register at the close of the twelve months was 85, representing in the aggregate 433 nominal horse power. There were laid during the year 1354 new services, and 100 were renewed. The consumption of gas for cooking, heating, and motive power was 57,960,200 cubic feet, against 51,801,300 cubic feet. The gas used for these purposes represents 15·12 per cent. of the total sales.

In concluding his report, Mr. Timmins says: "The working costs and general results will, I trust, have your approbation. Notwithstanding the almost unprecedented mildness of the winter, immunity from fogs, the general adoption of incandescent burners for private lighting, and the extension of public lighting by electricity in the Pemberton district, the increase in the consumption over that of the previous year is very gratifying. The net profit, £11,840, plus the value of gas supplied free for public lighting £3885—total, £15,725—proves a record in the annals of gas supply by the Corporation.

DEVONPORT CORPORATION GAS SUPPLY.

The First Year's Working.

The Gas Engineer to the Devonport Corporation (Mr. S. E. Stevenson) has just submitted to the Gas Committee returns for the year ending March 31—the first year under municipal management. He states therein that the quantity of coal and cannel carbonized was 30,162 tons 16 cwt.; and the gas made was 295,929,000 cubic feet, or 9811 cubic feet per ton. The gas sold was 268,177,325 cubic feet, or 90·63 per cent. of the make; that used on the works, &c., 4,047,000 cubic feet, or 1·36 per cent. of the make; and the gas unaccounted for, 23,684,775 cubic feet, or 8 per cent. of the make. The coke and breeze (estimated at 13 cwt. per ton of coal) was 19,605 tons, of which there was 16,627 tons used in carbonizing, &c., 3928 tons, or 20·03 per cent. of make. The coke consumed includes that used for boilers and main laying. The tar made was 297,996 gallons, equal to 9·88 gallons per ton of coal; and the sulphate, 186 tons 12½ cwt., equal to 13·83 lbs. per ton of coal. The make of gas per ton of coal carbonized was increased by 400 cubic feet, and the make of sulphate by 2¼ lbs.; while the unaccounted-for gas was reduced by 1 per cent. As to slot-meter installations, the number working during the year was 2444. The total gas consumption was 31,172,000 cubic feet; the average consumption per installation, 12,754 cubic feet; the cost of maintenance, £574 3s. 2d.; the cost of collection, £181; the average cost of maintenance per installation, 4s. 8·38d.; the average cost of collection per installation, 1s. 5·77d.; the total cash collected, £5195; and the average collected per installation, £2 2s. 6·18d. The average cash balance per installation over 2s. 6d. per 1000 cubic feet, available for interest and sinking fund on the capital expended, is 14s. 2d.; while the average required per installation for interest and sinking fund, at 5 per cent., is 6s. 4d. The total amount each installation has to pay for maintenance, collection, and interest, &c., is 12s. 6·15d., while each earned an average of 14s. 2d. The total number of installations fixed on March 31 was 3212. At a meeting of the Town Council on Thursday last, Mr. W. Hornbrook, the Chairman of the Gas Committee, said the present position of the undertaking and the immediate outlook were satisfactory. The financial statement, when it came to be published, would show that they had made a substantial profit.

STRETFORD GAS COMPANY AND THE CONSUMERS.

Particulars which have lately reached us from the district supplied by the Stretford Gas Company have revealed the existence of considerable discontent on the part of a large number of the consumers. The matter was taken up by the Urmston Ratepayers' Association, and a deputation from that body had an interview with the Directors on Monday last week, to discuss the various points on which dissatisfaction is felt—viz., high price, poor quality, inadequate pressure, and inaccurate meter registration. The members of the deputation were most courteously received by Mr. W. L. Galloway, the Chairman of the Company, who was accompanied by the Deputy-Chairman (Mr. W. A. Nicholls), the Secretary (Mr. B. Haynes), and the Engineer (Mr. H. Kendrick). Mr. Galloway having expressed the pleasure of the Directors that the Association had brought their complaints to headquarters, the Hon. Secretary (Mr. Frank H. Goude), in an exceedingly temperate statement, submitted for consideration three requests—viz., that the price of gas should be reduced from the 3s. at which it has stood since September, 1901; that the quality and pressure should be improved; and that some explanation should be given as to the cause of the increased consumption of gas recorded in certain quarters in comparison with corresponding periods. Mr. Galloway said he would leave his colleague Mr. Nicholls to reply to the second and third requests, for he was pleased to announce that the Directors had decided to reduce the price of gas to 2s. 9d. per 1000 cubic feet after June. Several members of the deputation having spoken, Mr. Nicholls proceeded to reply in detail to the various complaints. Dealing first with the quality of the gas, he showed that during the past twelve months it had had an average illuminating power of 18·45 candles, compared with the 16 candles the Company were bound to supply; and he pointed out that this figure was above the average of other towns in England. He directed the attention of the deputation to the subject of defective fittings, and explained that it was impossible, with such appliances, for the full light-giving value of the gas, or for adequate pressure, to be obtained. Mr. Gaggs (the Chairman of the Association) remarked that the chief complaint the deputation had come to press was in regard to the price. As to the high gas bills, it was possible that a large proportion of them were due to defective fittings, especially bad burners and leaky taps. Mr. Nicholls went on to give his audience some valuable information in regard to the capabilities of the Welsbach system for public lighting, and reminded them that they had offered to substitute it for the present flat-flame system, and thereby afford more than four times the light with practically the same expenditure. The figures he cited were pronounced to be "startling," and an intimation was given that they would be submitted to the District Council. Mr. Nicholls then went in some detail into the reasons for keeping the price at 3s. until now. He urged the use of gas in the day-time as conducive to cheapening the cost; stating that Mr. Kendrick had calculated that if the day-load in Stretford was equal to the night-load, more than three times the quantity of gas could be sent through the existing pipes. Reverting to the subject of bad fittings, a member of the deputation said that those in Urmston were "most deplorable"—a statement in which Mr. Gaggs concurred. The Chairman said he thought his colleague had given a very fair answer to all the questions brought before them; and he expressed the hope that what had been stated would bear fruit in the future in the shape of pleasanter relations. The object of the Directors was to do the best they could for the consumers; for this meant the best for themselves.

MACCLESFIELD CORPORATION GAS SUPPLY.

Record Profits.

The amount of the net profit of the gas undertaking of the Macclesfield Corporation for the past financial year was a few days ago intimated to the members of the Gas Committee. The total is £5599; and it is regarded locally as constituting a record. It must be highly gratifying to the town as well as to the members of the Committee; and it unquestionably reflects great credit upon the Gas Engineer (Mr. Ernest L. Newbigging). The gross profits amount to £9588; but against this there are the sinking fund and interest charges amounting to £3988, which leave the net gain at the amount stated. Of the profits, £1000 goes to the maintenance fund, and the remainder, £4599, which is equivalent to a rate of 1s. 1½d. in relief of the rates. Last year the new profits amounted to only £2400, and the large increase in the present year is attributable to the low price of coal latterly, and to the fact that coke and other residuals have been disposed of much more advantageously than in the previous twelve months. According to a statement published in a local paper by the Assistant Borough Comptroller (Mr. J. W. Herringshaw) showing the working of the gas undertaking in the past ten years, in 1897 the gross profit was only £2371, while the interest and sinking fund charges came to £3650; so that there was a loss of £1279. This, however, was wiped off next year. Since then the net profits have been £3322, £4880, £4497, £2400, and now £5599. The total gross profits in the ten years have been £66,292, out of which a sum of £37,720 has been paid for interest and to the sinking fund, £7252 has been used for maintenance, and £21,320 has gone in relief of the rates.

LIGHTING EXPERIMENTS AT WANDSWORTH.

The Borough Council of Wandsworth have lately been making some interesting experiments in lighting. At present there are close upon 5000 lamps in the borough, and the lighting bill comes to about £15,000 annually. Of this large number of lamps, only 26 are lighted by electricity. The remainder are gas-lamps, with, of course, incandescent mantles, drawing their supplies of gas from five different Companies, and depending on these bodies for lighting and general maintenance. As might be expected, the Companies have their different charges for gas; but the average cost of a lamp, giving about three times the illumination of the old flat-flame burner, works out at a little over £3 per annum. Of the 26 electric lamps, 17 are lighted by means of the electricity generated at the Council's dust destructor at Tooting; and the remainder by the County of London and Brush Provincial Electric Lighting Company. Inquiries and experiments (says the "London Argus") have been going on more or less systematically for several months past—various little improvements have been introduced into the existing lamps; and in some of the principal thoroughfares in Putney and Wandsworth proper, trials have been given to a few of the latest high-pressure incandescent gas-lamps, from which important developments are almost certain to arise shortly. In connection with these experiments, the thoughts of some of the Wandsworth councillors strayed towards the possibility of adopting the electric light. But some estimates which were presented to the Lighting Committee soon dissipated these notions; and it was decided that the initial expense of installing electric arc lamps and the cost of current and maintenance were so great that the idea could not be seriously entertained for a moment. The Brush Company were prepared to supply the current, charging 2d. per unit, and maintain the lamps for £18 10s. per annum each; and to this would have to be added the initial capital cost of the lamps and columns, for which the quotation was £19 each. On the other hand, it was found that with gas lighting, adopting one of the latest improved lamps—the Scott-Snell was the lamp estimated for—a splendid light of from 500 to 600 candle power, which was amply sufficient for the street in question, could be obtained for an annual outlay for gas and maintenance of £9 13s. 1d.; while the initial capital cost would be £8 13s. 6d. The total estimated cost was: Improved gas lighting, £265; electric arc lamps, £777. This estimate proved fatal to the chances of the electric light, and left the Council no option but to rely still on gas lighting. As a result, the Surveyor (Mr. P. Dodds) has been giving a trial lately to the Scott-Snell lamps; and it would seem from his practical experience of them, and the comments of the public, the verdict is likely to be favourable. Four of the lamps are to be seen in Putney High Street, and six in Wandsworth; and, compared with the ordinary incandescent gas-lamps, it must be confessed they put the others altogether in the shade. Still another experiment is that of the Lucas light. One of these lamps has just been put up at the corner of High Street and Southfield Street, near the Town Hall, and is already exciting a good deal of curiosity among the residents. Two powerful Sugg lamps may also be seen in front of Putney Railway Station. They are maintained by the London and South-Western Railway Company; at the cost to the Council of only two ordinary lamps.

PORT ELIZABETH IN DARKNESS.

The most severe rainstorm which has been experienced for the past six years broke over Port Elizabeth on the evening of Wednesday, the 22nd ult., when the registered rainfall between the hours of 1 p.m. and 8 p.m. was 2·8 inches. A curious feature of the storm was that its fury was principally directed against the lower parts of the town; and consequently when the deluge was at its worst the supply of gas gave out, which in private houses and places of business necessitated

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 428.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	April 17	10½	Alliance & Dublin 10 p.c.	19—20	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
200,000	5	May 14	6⅔	Bombay, Ltd.	5⅛—6*	..	5 8 4
140,000	5	,,	6⅔	Do. New, £4 paid	4—4⅛*	..	5 15 7
380,000	Stk.	Feb. 26	12	Brentford Consolidated	240—245	..	4 18 0
286,700	,,	,,	9	Do. New	178—183	..	4 18 4
50,000	,,	,,	5	Do. 5 p.c. Pref.	131—136	..	3 13 6
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	110—113	..	3 10 10
220,000	Stk.	Mar. 12	10⅔	Brighton & Hove Orig.	212—217	+3	4 19 1
246,320	,,	,,	7⅔	Do. A. Ord. Stk.	151—156	..	4 19 4
460,000	20	Mar. 31	10	British.	39—40	..	5 0 0
100,000	Stk.	Mar. 12	6	Bromley, 5 p.c. "A"	118—123	..	4 17 7
165,700	,,	,,	4½	Do. 3½ p.c. "B"	90—95	..	4 14 9
500,000	10	May 14	7	Buenos Ayres (New) Ltd.	11¼—11⅜*	..	5 19 2
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
150,000	20	Mar. 12	8½	Cagliari, Ltd.	23—25	..	6 12 0
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
1,375,000	Stk.	Feb. 26	5	Commercial 4 p.c. Stk.	103—106	..	4 14 4
503,750	,,	,,	4⅜	Do. 3½ p.c. ,,	99—102	..	4 13 2
407,812	,,	—	3	Do. 3 p.c. Deb.,,	89—92	..	3 5 3
800,000	Stk.	Dec. 11	8	Continental Union, Ltd.	115—125	..	6 8 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7
575,000	Stk.	Feb. 26	5½	Crystal Palace Ord. 5 p.c.	115—120	..	4 8 10
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—125	..	4 0 0
106,158	,,	Jan. 15	5	Do. 5 p.c. Deb. Stk.	137—140	..	3 11 5
486,090	10	Jan. 29	10½	European, Ltd.	18—19	..	5 10 6
354,060	10	,,	10½	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Feb. 12	4 1/16	Gas-light and Coke	4 p.c. Ord.	86—88	−1	5 0 0
2,600,000	,,	,,	3½		3½ p.c. max.	85—87	..	4 0 6
3,799,735	,,	,,	4		4 p.c. Con. Pref.	108—110	−1	3 12 9
4,193,975	,,	Dec. 11	4		3 p.c. Con. Deb.	88—90	..	3 6 8
252,500	Stk.	Mar. 12	5	Hastings & St, L. 3½ p.c.		90—95	..	5 5 3
70,000	10	Oct. 30	8	Hongkong & China, Ltd.		15—16	..	5 0 0
3,800,000	Stk.	May 14	10	Imperial Continental		200—205*	+3	4 17 7
473,600	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.		100—103	..	3 8 0
165,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.		115—120	..	5 0 0
561,000	Stk.	Feb. 26	10	Liverpool United A		218—220	..	4 10 11
718,100	,,	,,	7	Do. do. B		164—166	+1	4 4 4
306,083	,,	Dec. 31	4	Do. do. Deb. Stk.		113—115	..	3 9 7
75,000	5	Dec. 11	5	Malta & Medn., Ltd.		4⅛—5	..	5 0 0
560,000	100	April 1	5	Met. of Melbourne	5 p.c. Deb.	103—107	..	4 13 6
					4½ p.c. Deb.	101—103	..	4 7 5
250,000	100	,,	4½	Monte Video, Ltd.		10—11	..	6 7 4
541,920	20	Nov. 13	3½	Newc'tle & G'tesh d Con.		103½—104½	..	4 6 2
1,515,892	Stk.	Feb. 20	4½	Do. 3½ p.c. Deb.		96⅛—97⅛	..	3 11 10
376,855	Stk.	Jan. 2	3½	Oriental, Ltd.		140—145*	..	5 10 4
300,000	Stk.	May 14	8	Ottoman, Ltd.		6—7	..	5 0 0
600,000	5	Mar. 31	7			* Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
105,005	Stk.	Jan. 15	6⅛	Ply'mth & St'house 5 p.c	127—132	..	4 12 9
851,070	10	April 30	7	River Plate Ord.	11⅛—11⅜	..	5 19 2
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
250,000	10	April 17	8	San Paulo, Ltd.	12—13	..	6 3 1
135,000	Stk.	Mar. 12	10	Sheffield A	239—241	..	4 3 0
209,984	,,	,,	10	Do. B	237—240	..	4 3 4
523,498	,,	,,	10	Do. C	237—239	..	4 3 8
103,235	Stk.	Mar. 31	5	Shrewsbury Ord. 5 p.c.	111—114	..	4 7 9
6,000,000	Stk.	Feb. 12	5⅛	South Met., 4 p.c. Ord.	118—121	..	4 8 2
1,780,000	,,	Jan. 15	3	Do. 3 p.c. Deb.	90—92	..	3 5 3
380,940	Stk.	May 14	5	Southampton Ord.	105—110*	+2½	4 10 11
87,950	,,	Jan. 15	4	Do. 4 p.c. Deb.	103—106	..	3 15 6
120,000	Stk.	Feb. 26	6	Tottenham and Edmonton A. 5 p.c. B. 3½ p.c.	117—122	..	4 18 4
300,520	,,	,,	4½		96—99	..	4 10 11
182,380	10	Dec. 30	8	Tuscan, Ltd.	8¼—9¼	..	8 8 6
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	94—96	..	5 4 2
730,872	Stk.	Mar. 12	5	West Ham, 5 p.c. Ord.	95—100	..	5 0 0
				WATER COMPANIES.			
780,662	Stk.	Dec. 30	11⅛	Chelsea, Ord.	315—325	..	3 10 9
150,000	,,	,,	5	Do. 5 p.c. Pref.	145—150	..	3 6 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	130—140	..	3 4 4
175,785	,,	Mar. 31	4½	Do. 4½ p.c. Deb.	137—142	..	3 3 5
1,720,560	Stk.	Mar. 31	8	East London, Ord.	237—242	+2	3 6 1
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb.	142—147	..	3 1 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb.	96—98	..	3 1 3
700,000	50	Dec. 11	10†	Grand Junction 10 p.c. max. 4 p.c. Deb.	143—148	+8	3 7 7
310,000	Stk.	Mar. 31	4		123—128	..	3 2 6
708,000	Stk.	Feb. 26	10½	Kent	295—305	..	3 8 10
160,000	,,	,,	7	Do. New, 7 p.c. max.	195—205	..	3 8 4
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max.	315—325	+10	3 7 8
406,200	100	,,	8½	Do. 7½ p.c. max.	225—235	+5	3 12 4
350,000	Stk.	Mar. 31	4	Do. 4 p.c. Deb.	122—127	..	3 3 0
500,000	100	Feb. 12	12 5/16	New River, New Shares	395—405	+5	3 3 2
1,000,000	Stk.	Jan. 29	4	Do. 4 p.c. Deb.	123—128	..	3 2 6
902,300	Stk.	Dec. 11	7	South-wark and Ord. 7½ p.c. max. 5 p.c. Pref.	275—285	+4⅞	2 9 2
126 500	100	,,	7		215—225	+10	3 2 3
489,200	Stk.	,,	5		150—153	..	3 5 4
1,019,585	,,	Mar. 31	4	Vauxhall 4 p.c. A Deb.	122—127	..	3 3 0
1,155,066	Stk.	Dec. 11	10	West Middlesex.	300—305	+2½	3 5 7
200,000	,,	,,	4⅔	Do. 4⅔ p.c. Deb.	138—143	..	3 2 11
200,000	,,	Mar. 12	3	Do. 3 p.c. Deb.	95—97	..	3 1 10
					* Ex. div.		

† Next dividend will be at this rate

a falling-back upon oil-lamps and candles for light, while outside there was total darkness. This led a press representative to seek an interview on the following morning with Mr. William Arnott, the Manager of the South African Lighting Association's Port Elizabeth works, who explained that the cutting off of the gas supply was caused by the flooding of the works. The water, which was 2 feet deep, covered both the gasholder tanks, filling all the inlet and outlet pipes, and so preventing any gas from reaching the town. The men worked up to their waists in water until 2 o'clock in the morning following the storm, before everything was put right; but long before this the streets were re-lighted. Mr. Arnott remarked that it was a good thing the storm did not last fifteen minutes longer, or the water would have put out the fires, and there would have been no gas for the town for some days.

INCREASED GAS PROFITS AT BURTON.

A very favourable condition of affairs was indicated by Mr. T. E. Lowe, when moving the adoption of the minutes of the Gas and Electricity Committee at the quarterly meeting of the Burton-on-Trent Town Council, last Wednesday. He said that the past year's trading of the Gas Department (which is under the management of Mr. F. L. Ramsden) had been a successful one, as the net profits had gone up from about £4500 to nearly £8300, which was an increase of nearly £3800. This sum, however, included an amount of £1500 which they were setting on one side for repayment of the loans which had not come on last year's accounts, but which must be taken into consideration when making a comparison with the previous year's profits. The gross profit for the year was £14,606, which was equal to 7·3 per cent. on the total capital outlay and 17·7 per cent. on the debt. The net profit, after allowing the full amount of interest and repayment of loans, was equal to 3·4 per cent. on the capital and 8·2 per cent. on the debt. In a concern like that, where a good deal of the capital was sunk in plant the life of which could not be very long, as the plant wore out the capital disappeared, and was not remunerative. It was only fair, in considering the profit, to keep this fact in mind—namely, that the outstanding debt was the amount which should be considered in calculating the interest produced by the profits. Under these circumstances, he did not think the department had done very much amiss. On the other hand, the Committee were disappointed to find that, although they had spent the very considerable sum of £1500 in repairs to mains and services during the year, the leakage had not been reduced. This might be accounted for by the fact that, when the services were relaid—and they had dealt with more than 300 of them during the year—a certain amount of gas must escape. The continual annual increases which they had experienced in the sales of gas for a number of years past had at last met with a check; and this year the increase was not quite 1½ per cent. Whether or not this would delay the time when the extensions to the gas-works would have to be undertaken, remained to be seen. In the previous year they had the abnormal increase of nearly 10 per cent., and last year the law of averages had nearly equalized this down to the 5 per cent. which they expected to see. The slot meters continued to be very popular; but unfortunately at present these customers were not so profitable as the ordinary consumer. The period sanctioned for the loans was only ten years; and therefore the annual payments were so heavy as to more than swallow up the difference in the price charged to the two classes of customers. On the other hand, the life of a meter was certainly considerably more than ten years; and consequently when the loans ran out, the amount lost at present would be more than made up. These short-period loans fell very heavily on the department now; but in ten years' time they would gain a great benefit. There was one other point which he must ask the Council to remember in considering the profits of the gas-works. He had explained that the town had continued to pay for the street lighting on the basis of the old-fashioned small burners, and that the gas consumed in the large lamps and with special burners cost the department about £700 a year. This donation on the part of the Committee enabled Burton to be one of the best lighted towns in the kingdom. With regard to the electric light, the undertaking had not made the progress during the past year that he could have hoped. The sales had increased somewhat, but in nothing like the same proportions as was the case in the last year or two. The profit was only £162, as compared with £545 in the previous year; but this could easily be accounted for by the fact that the assessment had been raised from £150 to £940. Although the profits were £382 less than last year, the Corporation had received most of it back in rates.

GAS SUPERSEDES ELECTRICITY IN CORK.

For the past three years a number of the streets in Cork have been lighted—after a fashion—by incandescent electric lamps, which were nominally of 16-candle power. Their appearance, however, gave the inhabitants a very poor opinion of the value of the "candles" as light-givers; and the consequence was that the Corporation were asked to revert to the gas-lamps with which the streets were previously lighted. Tenders were invited, and the Public Works Committee were engaged for a considerable time a few days ago in discussing the terms submitted. The Electric Light Company said they were prepared to substitute for each existing 16-candle Nernst lamp another of 40-candle power for £3 5s. per lamp for one year, or a 90-candle lamp at £5 7s. 6d. In order that the capabilities of the two lamps might be estimated, they had fitted up one of each in two streets of the city. They said they would be prepared to continue the arrangement for a year; and if at the end of that time they found that the cost of maintenance exceeded

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the present computation, they would ask the Committee either to pay the increased cost for the remaining period of two years, or allow the Company to revert to the present terms until the expiration of the contract. The Cork Gas Company expressed their willingness to enter into a contract for at least three years for the erection of incandescent gas-lamps in the streets specified. The electric lamps at present in use were 47 16-candle power lamps (752 candles), three 32-candle lamps (96 candles), and one 50-candle lamp—making a total nominal candle power of 898. For the 16-candle lamps the charge was £3 per annum; for the 32-candle, £4; and for the 50-candle, £5 7s. 6d.—all to be kept alight for 4000 hours, and renewed when necessary. Instead thereof, the Company proposed to fix 50 nominal 60-candle gas-lamps (3000 candles) and a 150-candle lamp at a certain church; giving a total candle power of 3150. The annual charge, payable quarterly, would be £2 17s. per lamp, which would cover the cost of gas for 3700 hours, the repairs and renewals of the columns and lanterns, and painting them once a year. The Committee unanimously agreed to recommend that the tender of the Gas Company be accepted for the three years, and that the Electric Lighting Company be written to asking them to reduce the price of the arc lamps.

RECENT GAS EXHIBITIONS.

An interesting exhibition of gas cooking-stoves and appliances was held last week under the auspices of the Aylesbury Gas Company. The arrangements were superintended by the Gas Manager (Mr. George Lane); and lectures were given each afternoon and evening by Miss M. S. Gurney, who represented the Davis Gas-Stove Company. The exhibition was opened by Miss Parrott; and in thanking her for her attendance, Mr. Lane referred to an installation of Lucas lights at an establishment in the High Street. He said that to light the place in the same way with electricity would cost 6s. 9d. per hour, whereas with gas the cost would be 6d. per hour. To arrive at these figures, he had reckoned electricity at 4½d. per unit, though in many instances it was sold at 6d., and even a higher price. A feature of the exhibition was an installation of electricity, in the charge of Messrs. A. G. & G. T. Lane, for the purpose of comparing, by means of the shadow test, this method of illumination with the incandescent gas system for street lighting. The result, of course, was strongly in favour of the latter. A gas exhibition that was promoted by the Swadlincote Urban District Council was opened last Tuesday night, in the Town Hall, by Mr. J. Thornley, J.P. Under the superintendence of Mr. G. B. Smedley, the Gas Engineer and Manager, the interior of the spacious building was arranged with stands exhibiting appliances furnished by Messrs. Fletcher, Russell, and Co., Limited, the Richmond Gas Stove and Meter Company, Limited, and Messrs John Wright and Co. Messrs. Moffat and Co. showed a chandelier gas-light with three globes, each giving a light of 100 candles. The Lucas light of 400-candle power, was much admired. One of these lamps, of 700-candle power, was placed over the portico, and another, of 400-candle power, in the Market Place. A very successful exhibition of gas appliances has just been held at Great Marlow, under the auspices of the Gas Company, by whose Chairman (Mr. G. R. Ward) it was opened. Messrs. Fletcher, Russell, and Co. supplied the cooking and heating stoves; Messrs. T. Glover and Co., Limited, showed a slot meter, to which the Gas Manager (Mr. G. Wood) had fitted an incandescent burner; and Messrs. Moffat sent two Lucas lamps. Cookery lectures were given by Miss Helen Edden; and Messrs. Fletcher, Russell, and Co.'s representative (Mr. Jones) gave some interesting demonstrations in bread baking. A successful exhibition of gas cooking, heating, and lighting appliances has just been held at Maidstone, under the auspices of the Maidstone Gas Company, in conjunction with the Richmond Gas Stove and Meter Company, Limited.

ELECTRIC LIGHTING NOTES.

Improved Outlook at Taunton.

As some compensation for its recent troubles, the Taunton Electric Lighting Committee were able last week to report that the undertaking had made a fairly substantial profit during the past fifteen months. The total amount was £1444, of which £670 was carried as a contribution to the rates; the balance going to the reserve fund. Consumers are to have a reduction in price, and the charge for public lighting is also to be reduced.

Southwark's Electric Light.

Last Wednesday, at the meeting of Southwark Borough Council, the Special Committee appointed some time ago to inquire into the administration of the electric light undertaking presented a long report to the effect that the extension made at the beginning of the Council's existence had not been justified by results. A hope was expressed that the undertaking would soon become self-supporting. It was recommended that a system should be introduced of canvassing for customers by persons paid by commission. Mr. Haynes said the report stated that up to date 29,168 8-candle lamps had been connected. This was correct; but he believed it would be found that the number mentioned was gross, and that the lamps which had been disconnected had not been deducted. Mr. Newman, the Chairman of the Committee, said he thought the last speaker was mistaken. However, inquiries would be made. Mr. Hilton said some of the electric lights at the Railway Approach near the Elephant and Castle were little better than farthing rushlights. He condemned the whole scheme. Eventually, the further consideration of the report was adjourned.

The Value of a Guarantee.

The Bangor City Council engaged themselves in the electric lighting business, partly at least because a number of gentlemen signed

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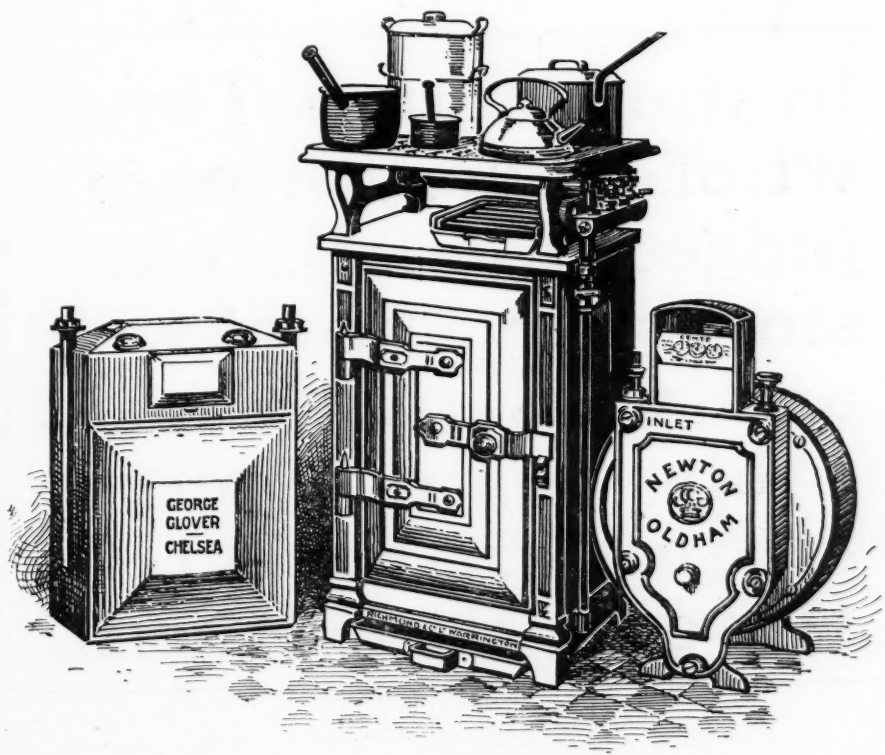

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a guarantee to take or pay for a certain amount of current per annum for five years. At any rate, it was this fact which induced the Chairman of the Finance Committee (Alderman Roberts) ultimately to vote for the scheme, which he opposed at the outset. Now, however, it has been found that many of those who joined the guarantee have no idea of fulfilling their obligations; and hence it is that there is a deficit of £1099 on the electric lighting account, £750 of which is the outcome of the past year's working. This deficiency will, of course, have to be made good out of the rates. The total rates are now 9s. 4d. in the pound? whereas in 1885 they were 4s. 6d. It is impossible not to agree with Alderman Roberts that the condition of the electricity undertaking is most unsatisfactory; but surely some means can be found of keeping the defaulting guarantors to their bond. Estimates of probable consumption form but a poor foundation on which to build an electric light works; but in this case there would appear to have been a definite promise of support.

Electricity v. Gas for Tramway Lighting at Reading.

At a recent meeting, the Reading Town Council had before them reports from the Borough Engineer (Mr. J. Bowen) with reference to the question of introducing electric arc lighting on the principal tramway routes. The Manager of the Electric Light Company had offered to supply electrical energy in bulk at a pressure of 400 volts continuous to a point (say the tramway generating station) to be agreed upon; such energy to be registered by meter, and to be on the basis of an installation of not less than 100 10-ampere arc lamps. The rates would be: (1) For a supply from dusk to dawn, 1¾d. per unit; (2) for a supply from dusk to midnight, 2¼d. per unit. With regard to the second proposal, the Company were not prepared, without further consideration, and previous discussion with the Borough Engineer of various points of detail, to quote terms for a supply on these lines. Mr. Bowen stated: "The tramway traction centre poles are erected at intervals of 40 yards; and if, as I would recommend, a lamp were lighted on every pole until midnight, and after that hour on every alternate pole, the average cost of lighting and maintenance per lamp per annum on the basis of the Company's offer would be £16. This sum includes the supply of current and the upkeep of the lamp, but includes no installation cost. Approximately the first cost of installing 108 lamps would be £4500." He added that his second proposal covered the supplying, installing, lighting, and maintaining by the Electric Supply Company of 100 arc lamps on the east and west tramway routes, the Corporation only providing the poles and drawing-in boxes. As the Company had not yet had time to consider the details of the proposal, the subject was adjourned, and the Borough Engineer was instructed to submit to the Committee an estimate of the cost of lighting the routes by incandescent gas.

Mr. A. J. S. Pinchin has succeeded Mr. W. J. Lewis in charge of the portable photometer of the London County Council.

METROPOLITAN WATER BOARD.

At the Meeting of the Board last Friday—Mr. R. M. Beachcroft in the chair—the Finance Committee reported, with regard to the resolution passed at the last meeting that the Bank of England should be the Bankers of the Board, and that application should be made for an advance of £5000, that communication had been made with the Bank, and the Committee had learnt that all that was required was a resolution asking for the advance, and giving the names of the persons who were to sign the cheques for the account. It was proposed that two members of the Committee should sign cheques; the same being countersigned by the Clerk, or, for the time being, the Acting Clerk. The report was adopted. The General Purposes Committee submitted the proposed Standing Orders of the Board, which, with two or three amendments, were approved. They provided that the meetings should be held at 2.30 in the afternoon of Friday in each alternate week, unless otherwise ordered. Mr. H. P. Harris presented the report of the Law and Parliamentary Committee. It stated that the Court of Arbitration had issued a notice and order that they intended to hold the first public sitting of the Court on Friday, the 29th inst., at 10.30 a.m., at the Council Chamber, Guildhall, Westminster, and that notice of any application to be made to the Court must be given in writing to the Secretary on or before the 27th. It could hardly be supposed that the Board could be ready with their answers to the statements of claim of the Companies by the 17th of August; and it seemed, therefore, desirable that application should be made for an extension of time. What extension should be asked for needed consideration. On the recommendation of the Committee, the Board agreed to the following resolution: "That the Law and Parliamentary Committee be authorized, if they think fit, to cause notice to be given of the intention of the Board to apply to the Court for such extension, and to decide what extension should be asked for." The report was adopted, and the Board adjourned.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners fixed their coal contracts for the year on Monday last. As usual, the Commissioners met in private and fully considered a report by Mr. Herring, and, having adopted it, the proceedings were made public, and effect was given to the resolution of the Committee. This year the Commissioners were in the happy position of being able to agree to the whole business without dissent. Hitherto there has been dissatisfaction on the part of some of the members at their not being allowed longer time to consider Mr. Herring's report. This, for obvious reasons, it would be indiscreet

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to allow; and consequently it is necessary to carry through the business at one sitting. This year the dissentient members—who, strange to say, were in the coal trade—have apparently seen it to be the more reasonable policy to acquiesce in what the majority considered best. At all events, they did acquiesce. The Commissioners have purchased 60,000 tons of high-class cannel, 120,000 tons of splint and common coal, and 5000 tons of coking coal. Provost Mackie, of Leith, who presided, said they were paying on an average 9d. per ton less than they did last year. They proposed to purchase only 2000 tons of oil, instead of 4000 tons, the price having risen. Even with the diminished amount, the price of oil would be £2000 more than last year; but that still left a net profit of £5000 to the Commissioners. I may mention that the oil used in the year ending May last was 3418 tons. It is evident, therefore, that unless there are unexpired contracts for oil, the Commissioners contemplate the restriction of the use of carburetted water gas. The average price of the coal this year is stated to be 12s. 3d. per ton.

Referring to the purchase, a writer in the commercial columns of the "Glasgow Herald" says: "The total quantity bought amounts to from 160,000 to 180,000 tons. Three or four 15,000 to 20,000 ton lots of first-class cannels have been purchased at a reduction of about 1s. 6d. to 2s. per ton on last year's prices. Large quantities of Lothian splints and some coking coal have been contracted for at 3d. to 6d. per ton of a reduction; the lots ranging in size from 2000 to 20,000 tons. A number of other Scottish gas corporations have bought on similar terms. They have also been buying third-class cannels at 1s. 6d. to 2s. per ton less than last year; and those cannels which produce good coke are likely to be taken up." Of course, this is merely Stock Exchange gossip, and must not be accepted as in all respects accurate; but gas managers who have still to buy may be helped by knowing what is the drift of opinion on the Exchange.

At this week's meeting of the Kilsyth Town Council, Colonel Frew, who is Convener of the Gas Committee, stated that the renovation of the gas-works (which was effected under the advice of Mr. A. Yuill, of Dundee) had cost £1832; but there were still some accounts to come in. They started the year with £300 in hand; and, after everything was paid in connection with the reconstruction works, they would be in possession of something like £1100. In the coming year he expected that their expenditure would be less by about £270, due to the reduction in the price of coal and in the cost of carting, as well as to their tar and liquor contracts. The saving they would effect would enable them to reduce the price of gas by 5d. per 1000 cubic feet, making it 3s. 4d.; and if everything went well with them, he anticipated another reduction of 5d. very soon. The proposed reduction was agreed to.

The annual meeting of the Fraserburgh Gas Company was held on Monday. It was resolved to reduce the price of gas from 4s. 7d. to 4s. 2d. per 1000 cubic feet. The Gas Company is described as one of the most prosperous business concerns in the locality.

The deputation from the Broughty Ferry Town Council, whom I mentioned last week as having gone to London to furnish information to the Secretary for Scotland regarding the loan of £25,000 which they propose to raise in connection with the gas undertaking of the Corporation, have had two interviews with the officials at the Scottish Office. Not satisfied with the explanations which were given, the officials of the Government Department requested Mr. Joseph Hepworth to report upon the condition of the gas-works with reference to the proposed loan.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May* 16.

Sulphate of Ammonia.

The market has been somewhat irregular, and in Scotland extreme prices are reported to have been paid in the case of urgent orders. There has been a disposition on the part of buyers to avail themselves of the lower level of prices current since the close of April, and on the week there has been a slight improvement in values; the closing quotations being £12 16s. 3d. per ton f.o.b. Hull, and £12 17s. 6d. to £13 per ton f.o.b. Liverpool and Leith. For June delivery, the value is about 2s. 6d. per ton less; while July-December delivery is quoted £12 10s. per ton f.o.b.

Nitrate of Soda.

This article is easier on spot, the quotations being reduced to 9s. 4½d. and 9s. 7½d. per cwt. for ordinary and refined qualities respectively. The forward position does not appear to have been appreciably affected by the announcement of the fixing, provisionally, of the maximum of shipments, April, 1903, to March, 1904, at 31⅜ million quintals, 85 per cent. up to the end of 1903; the value of October-November shipments remaining at about 9s. 1½d. per cwt. full delivered terms.

LONDON, *May* 16.

Tar Products.

The market has been decidedly quiet during the past week. In pitch, further business has been done in South Wales—principally, however, for early delivery; but there is an absence of Continental demand, consumers evidently believing in a fall in value. In 90 per cent. benzol, business was done to a limited extent at 9d. f.o.b. London; while 8¾d. was accepted at an outport for prompt shipment. There is no business whatever doing in 50-90 per cent. Consumers offer only 7d., which makers decline to accept. Solvent remains very dull. It is reported that a contract was made in the North at 7d., casks included, for July-December delivery. Toluol continues in the same position; but there is now rather more pure offering, which, however, does not find buyers at present. The demand for crude carbolic is scarcely so good, although makers are still very firm. Sales are reported at 1s. 6¼d. at outports, May-June shipment; but makers still decline 1s. 7d. for July-December. In crystals, there is only a very

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The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

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limited business doing, principally with the German makers. The market for creosote is easier, especially in London, where large sales are reported at reduced prices. In anthracene, a small business continues to be done in "A" quality at 1¾d. per unit for 40 per cent. It is generally believed that the German alizarine makers would purchase forward at an improved value; but English producers do not care about contracting forward at present. Crude naphthalene is in fairly good demand for forward delivery; but there is not much offering for prompt.

The average values during the week were: Tar, 21s. 6d. to 28s. Pitch, London, 57s.; east coast, 54s.; west coast, 52s. 6d. to 53s. Benzol, 90 per cent., 8¾d. to 9d.; 50-90 per cent., 7d. to 7¾d. Toluol, 7d. to 7⅞d. Crude naphtha, 3d.; solvent naphtha, 7d. to 8d.; heavy naphtha, 9d. Creosote, London, 1⅜d. to 1½d.; North, 1⅛d. to 1¼d. Heavy oils, 2d. to 2⅛d. Carbolic acid, 60 per cent., 1s. 6½d. to 1s. 6⅝d. Naphthalene, 30s. to 45s.; salts, 21s. 6d. to 23s. 6d. Anthracene, "A" quality, 1⅜d. to 1⅞d.; "B" quality, 1d. nominal.

Sulphate of Ammonia.

The market closes with a decidedly quite tone, and prices seem a little easier all round, although there is very little offering. As regards Beckton, the position is unchanged. They are still sellers at £13 per ton for June, and will not quote forward. In Leith, makers report sales at £13; but this was evidently for prompt shipment. There is not much inquiry forward. In Hull, there are sellers at £12 17s. 6d. for May-June; but consumers will not pay more than £12 15s., and do not seem anxious to purchase even at this price. In Liverpool, there is no business of importance to report. The general tone of the market is decidedly easier, although for prompt delivery there is a fairly good inquiry.

COAL TRADE REPORTS.

London Gas Coal Contracts.

The following statement with regard to the coal contracts of the South Metropolitan Gas Company has been received by the "Financial Times" from its Newcastle Correspondent: "After several weeks' negotiation, which has not been unattended with rather severe haggling between buyers and sellers, the South Metropolitan Gas Company have purchased their large requirements of gas coal for the ensuing twelve months. In all, this Company consume about a million-and-a-quarter tons of gas coals per annum; and of this quantity it is said that about half-a-million tons have been arranged for with Yorkshire and Northumberland collieries at 7s. 10½d., which is understood to have been paid for Yorkshire coal, and 8s. for the Northumberland qualities. The remaining three-quarters of a million tons have been distributed among the leading Durham collieries, in varying quantities, and at prices ranging from 8s. minimum to 9s. maximum; the latter figure being secured by the well-known 'Wearside' collieries, which produce the best gas coal in the country. Good average qualities have realized from 8s. 3d. to 8s. 6d., and slightly inferior kinds 8s. to 8s. 1½d. The contracts have this year taken some time to settle, owing to the firmness of the Durham collieries in holding out for what they considered to be a fair price in relation to other contracts which they have secured; and I learn that some of these collieries have refused the quantities offered them at the prices stipulated, and have preferred to do without the business. However, one way and another, the South Metropolitan Company have now about completed their arrangements at a reduction of 7½d. to 9d. a ton compared with last year's rates, which ranged from 8s. 9d. to 9s. 1½d. a ton, as against 8s. to 9s. this year."

Lancashire Coal Trade.

Generally the coal trade outlook in this district is not regarded as at all encouraging by colliery owners; and indications point to anything but satisfactory business prospects. Already there is undoubted slackening off in the demand, and the general trade position throughout the principal coal-using industries of Lancashire scarcely affords much promise of enlarged requirements in the near future. For the present, pits are mostly working pretty nearly full time. The increased buying following the reduction in prices, and also helped by the continued inclemency of the weather, has enabled collieries to dispose of their output in the better and medium qualities of round coal without much difficulty. For these, prices remain steady at the revised rates, averaging about 14s. and 14s. 6d. per ton at the pit for best Wigan Arley, 11s. and 11s. 6d. to 12s. for seconds Arley and Pemberton four-feet, and about 9s. 6d. to 10s. 6d. for the commoner descriptions of house-fire coal. Common descriptions of steam and forge coal for inland sale are quoted at from 8s. 3d. to 8s. 9d. per ton, with better descriptions quoted at 9s., and in some cases 9s. 3d., for delivery at the ports on the Mersey. However, as low as 9s. 3d. and 9s. 6d. is being taken for common steam coals, with 10s. to 10s. 3d. quoted in some cases for the better descriptions. As reported last week, renewal contracts for fairly large quantities of gas coal have recently been settled, among these being the contracts for the Salford Corporation. Although the actual price at which the Corporation have been able to buy has not been allowed to transpire, it is very definitely reported that the general basis has been from 3d. to 5d. under last year—a reduction of 5d. probably representing the basis at which the bulk of the quantities are being supplied. This bears out what has previously been intimated in these reports as to the probable course of gas coal prices for the ensuing season; and, taking a comparison of last year's prices, when there was a very general reduction of 1s. up to 1s. 6d. per ton in special cases upon the 1902 figures, an approximate average of prices for the present season may be arrived at. Last year the contract basis for ordinary screened Wigan four-feet gas coals was about 9s. to 9s. 3d. per ton, and for best screened Wigan Arley about 10s. to 10s. 3d. per ton at the pit. The reductions on last year's basis at which renewal contracts have been taken would represent a basis of about 8s. 6d. to

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BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	ACCRINGTON	500,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	YORK (Second Contract)	750,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract)	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil)	125,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	GRAVESEND	300,000
BRANTFORD Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract)	750,000
		KINGSTON-ON-THAMES	1,750,000		

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract) . . . . . 1,800,000 Cub. Ft.

9s. for ordinary screened Wigan four-feet, and from about 9s. 6d. and 9s. 9d. to 10s. for best Wigan Arley. The prices of the better qualities of slack, of which there are still no plentiful supplies on the market, are pretty well maintained at about 6s. 9d. to 7s. up to 7s. 3d. per ton at the pit for special qualities; medium sorts are also fairly well maintained at late rates, on the basis of about 5s. 6d. to 6s. per ton, with special qualities 6s. 3d. Inferior sorts of slack are, however, beginning to hang at most of the collieries; 4s. 6d. to 4s. 9d. per ton at the pit representing about average figures, with some collieries getting 5s.

Northern Coal Trade.

There is a fair amount of activity, but without very much pressure in demand; and the large contracts do not seem to have been very rapidly concluded. Best Northumbrian steam coals are 10s. 9d. per ton f.o.b., second-class steams are 9s., and steam smalls are steady at from 5s. 6d. to 5s. 10½d.; the collieries being generally well employed. In the gas coal trade, the general quotation for occasional cargoes is now from 8s. 6d. to 8s. 9d. f.o.b. in the Tyne; but the deliveries—which are fair for the season—seem to be on the long contracts. Negotiations for the renewal of these are now taking place, and very large quantities have been already placed; but the prices vary according to the class of the coal. There are still, however, considerable amounts to be fixed; and thus the average price cannot be stated yet, though it is pretty certain that it will be greatly below that of the expiring contracts. For gas coke the price is maintained at about 12s. 3d. to 12s. 6d. per ton f.o.b.

Scotch Coal Trade.

There is no change upon the spot market; but it will be noted that the Edinburgh and Leith gas coal contracts have been entered into for another year at a considerable reduction. The day-to-day demand is not so strong as it is generally wished it were, in connection with which it may be said that the shipping branch of trade is being found to be very difficult to move. The prices quoted are: Main 8s. to 8s. 3d. per ton f.o.b. Glasgow, ell 8s. 9d. to 10s., and splint 9s. 3d. to 9s. 6d. The shipments for the week amounted to 214,429 tons—an increase of 5960 tons upon the previous week, but a decrease of 12,036 tons upon the corresponding period of last year. For the year to date, the total shipments have been 3,484,221 tons—an increase of 101,957 tons upon the same period of last year.

The Millennium Light Syndicate, Limited, has been registered with a capital of £200, in 1s. shares, to "carry on the business of a gas company in all its branches; in particular, to acquire, work, and turn to account patents, inventions, and secret processes relating to improvements in, or the intensifying of, the illuminating or heating properties of gas, and to carry on any business, electrical, mechanical, or otherwise, relating to lighting, heating, or motive power." There will be no initial public issue.

New Joint-Stock Company.—The Cyanide Manufacturing Company, Limited, has been registered, with a capital of £30,000 in £1 shares, "to adopt an agreement with H. C. Woltereck, and to carry on business as manufacturers of hydrocyanic acid, cyanogen compounds, and cyanides (including those of potash and soda), and all materials used in such manufacture (including ammonia and compounds and salts of ammonia), carbonic oxide, and gaseous and volatile compounds of carbon, water and producer gas, coal gas, alkalies, and alkaline carbonates, general chemical manufacturers, &c." There is to be no initial public issue.

New Mills Gas Supply.—The annual meeting of the New Mills Urban District Council was recently held in the Town Hall, under the presidency of the Chairman (Mr. D. Woods). In calling upon the Gas Manager (Mr. J. R. Mackenzie) for his annual report, the Chairman said the results of the year's working would be very satisfactory to all, when they knew that they had made over £404 clear profit. He thought this was very creditable to the Manager. Mr. Mackenzie then read his report, which contained the following figures: Coal and cannel carbonized, 2036 tons; gas manufactured, 21,692,500 cubic feet (an increase of 1,341,500 cubic feet, or 6·58 per cent.); total receipts, £4430 19s. 7d.; total expenditure, £4026 18s. 4d.; and net profit for the year, £404 1s. 3d.

Winsford Gas Supply.—At the annual meeting of the Winsford (Cheshire) Urban District Council recently, the Gas Manager (Mr. F. Sidwell) reported that during the year 2,902,800 cubic feet of gas had been lost owing to subsidence. This was equal to 16·69 per cent. of the total production. The quantity sold was 13,866,200 cubic feet; the revenue being £3913 5s. 11d. He, however, stated that the leakage was 1·65 per cent. less than in the previous year; and the lowest for 20 years. The quantity of coal used was 1570 tons, which produced, on an average, 11,070·38 cubic feet of gas per ton. The estimated profits on the year's working, which represented 7¼ per cent., were as follows: £300, expended out of revenue to increase the capital account; £1010 11s. 3d., principal repaid and interest.

Birkdale and Ainsdale Amalgamation.—An agreement was entered into, and signed and sealed by the Birkdale Urban District Council and the Ainsdale Parish Council on the 30th ult., by which the district of Ainsdale shall, with the consent of the Local Government Board, form part of the township of Birkdale. The district rate is to be 1s. 6d. in the pound for fifteen years, and the rate for sewage not more than 1s. At no time during this period shall any rate or other imposition be levied in the added township for the purpose of making up any deficiency of, or for, the Southport, Birkdale, and West Lancashire Joint Water Board. The Birkdale Urban Council will, so soon as lies in their power after the date of incorporation, connect their gas-mains with those in the added township, and will use their best endeavours to arrange for the supply of gas in the added township for all public and private purposes on at least as favourable terms to the consumers as shall at the time being exist in the township of Birkdale, and will do their best to get the supply of electricity extended to Ainsdale.

MILBOURNE'S

PATENT LUTELESS

PURIFIERS

SAVE

GAS, GROUND SPACE, & CONNECTIONS.

ERECTED OR IN HAND AT THE FOLLOWING GAS-WORKS:

WREXHAM, DORKING, MITCHAM, RUGBY, EVESHAM, BOLOGNA (ITALY), SEDGELEY, VALPARAISO (CHILI), &c., &c.

SOLE MAKERS—

C. & W. WALKER, LTD.,

Midland Iron Works:
DONNINGTON, NEWPORT, SALOP.

London Office:
110, CANNON STREET, E.C.

Abnormal Consumption of Gas in Manchester.—The consumption of gas in Manchester last Wednesday was unprecedented in the history of the Corporation Gas Department. The stock of gas at 8 a.m. on that day was 11,700,000 cubic feet. During the following 24 hours 10,545,000 cubic feet were manufactured, which, added to stock, made a total of 22,245,000 cubic feet. During the same 24 hours the consumption was 15,485,000 cubic feet, compared with 10,880,000 cubic feet, or an increase of 42·1 per cent., on the corresponding day of last year; leaving 6,760,000 cubic feet in stock at 8 a.m. on Thursday. This extra consumption was mainly in the daytime, and was a greater increase than on any day during November last. The consumption on Thursday was 13,528,000 cubic feet, compared with 10,815,000 cubic feet on the corresponding day of last year. The increase for the week ended on Thursday was 11·19 per cent. compared with the corresponding week of 1902.

New Water-Works for Maesteg.—Last Thursday, Mr. M. K. North, M.Inst.C.E., conducted an inquiry on behalf of the Local Government Board into an application by the Maesteg Urban District Council for sanction to borrow £30,410 for the construction of a reservoir to hold 30 million gallons, at Blaencwmceryn, in the hamlet of Cwmdu. Mr. R. Scale, the Clerk to the Council, said the population of Maesteg was at least 16,500. Ten years ago the assessable value was £15,000, whereas now it was £50,000; and it was probable that in two years it would reach about £100,000. The water scheme had become imperative, and the Local Government Board had for some time been pressing the Council to proceed. The Council had obtained a lease of the necessary land for 99 years, at an annual rent of £10; the gathering-ground being 200 acres. The plans prepared by the Surveyor (Mr. J. Humphries) had been inspected by Mr. C. A. Brereton, M.Inst.C.E., who had expressed satisfaction with the scheme. There was no opposition.

Portsmouth Water Company.—At the half-yearly meeting on the 21st inst., the Directors of this Company will report an available balance of £23,019 on the profit and loss account, out of which they will recommend the payment of the full statutory dividends. This, after deductions for void houses, &c., will leave a balance of about £6013 to be carried forward. During the six months ending the 31st of March, 1579 yards of additional street service mains and 1556 yards of trunk mains were laid; making a total of about 55 miles of the latter and 137 miles of the former. The number of additional services connected with the mains during the half year was 641; making the total number of premises now under constant supply by the Company in all the districts, 42,797. The quantity of water pumped was 1,233,150,020 gallons, or an average daily supply for all purposes of 6,775,500 gallons; being a decrease of 800,300 gallons daily as compared with the corresponding period of last year. The quantity supplied for domestic use was equal to an average of about 24·5 gallons per diem per head of the population, exclusive of all supplies by meter. The number of fire hydrants now fixed is 3386. The engines, boilers, reservoirs, and works are reported by the Company's Chief Resident Engineer (Mr. Herbert Ashley) to be in good working order.

The New Gas-Works for Walker.—The Estate and Property Committee of the Newcastle Corporation have decided to offer the Walker and Wallsend Gas Company a piece of ground at Walker on which to erect their new gas-works, adjoining the Newcastle works, and thus bring to a termination the dispute between the two bodies.

Gas Profits at Belfast.—It is stated that the profits on the Belfast gas undertaking for the twelve months ending March 31 are greatly in excess of those for the previous year—owing, in the first place, to the careful working of the concern by Mr. James Stelfox and those associated with him, and, secondly, to the more advantageous purchasing of coal and the saving effected by the use of oil. Close upon £20,000 a year is now handed over in relief of the rates—that is, £15,000 directly, and the balance towards the payment of the interest on the new City Hall.

The Maidstone Explosion; a Settlement Arrived at.—At last the dispute between the Maidstone Corporation and the Gas Company has been settled by the acceptance by the former of the Company's offer to pay £500 in full settlement of the damage done to the bridge by the fatal gas explosion which took place at the end of last year. All efforts to induce the Company to increase the amount of their offer were fruitless, the Directors having already gone as far as they felt able to do in justice to their shareholders; and the Corporation had, therefore, the choice between accepting this and going to law at the risk of being held liable for the whole of the damage caused, as well as the costs of the action. They have chosen the wiser alternative.

Ware Gas Company.—The accounts presented at the annual meeting of this Company show a very satisfactory development of the undertaking under the management of Mr. Clark Jeffery, who was appointed to succeed the late Manager in October, 1900. The net profit in 1902 was £1570, compared with £1146 in 1900—an increase of £424. In the latter year, the quantity of coal carbonized was 1904 tons, and the gas produced was 18,251,000 cubic feet, or 9585 cubic feet per ton. Last year the quantity of coal carbonized was 1878 tons, and the gas produced was 21,024,000 cubic feet, or 11,190 cubic feet per ton; being an increase of 1605 cubic feet per ton compared with 1900. Excellent results, considering the size of the works, were also achieved in the fuel account, only 266 tons of coke being used in the furnaces and in the works during the year 1902, compared with 520 tons in 1900, showing a fuel consumption of only 14 lbs. of coke per 100 lbs. of coal carbonized, compared to 27⅛ lbs. during the year under review. In 1900, considerable extensions and additions to the works were carried out to plans prepared by Mr. A. F. Phillips, M.Inst.C.E., of Westminster, including a new retort-bench of three beds of six 21 in. by 15 in. Ω retorts 9 feet long, erected by Messrs. Gibbons Bros., Limited, of Dudley, on their improved regenerative system with Gibbons and Masters' patent "A B C" tiles. With the new installation, Mr. Jeffery last winter produced 116,000 cubic feet of gas per 24 hours out of two beds of six retorts, equal to 9660 cubic feet per mouthpiece per day.

The "MAIN" Gas Cooker

WITH LATEST DEVELOPMENTS.

SPECIAL FEATURES.

OUR NEW PATENT ENAMEL is guaranteed free from Lead or other Poisonous Chemicals.

Inside Fittings, Porcelain Enamelled.

Can be supplied with Moveable Burners, if desired.

ORDERS DESPATCHED SAME DAY AS RECEIVED.

R. & A. MAIN, LD., LONDON: 214 ST. JOHN ST. | GLASGOW 26, W. NILE ST. | FALKIRK: GOTHIC WORKS.

Proposed Purchase of the Appleby Gas-Works.—Negotiations have been entered into for the acquisition by the Appleby Corporation of the Gas Company's undertaking; and the Company have consented to sell according to a valuation to be made by two experts. The Sub-Committee who have the matter in hand have been empowered to proceed with the negotiations and appoint a valuer on behalf of the Corporation.

Reduction in Price.—The Directors of the Stretford Gas Company announce a reduction in price to 2s. 9d. per 1000 cubic feet after the reading of meters next month. Consumers of more than 25,000 and less than 500,000 cubic feet per quarter will be charged 2s. 8d., and above the latter quantity 2s. 7d. For manufacturing and power purposes, for each works, building, or premises, on daylight consumption through separate meters only, the charges will be 2s. 6d. per 1000 for anything less than a million cubic feet per quarter, and 2s. 4d. for quantities beyond this limit.

New Water-Works for Didcot and Hagburne.—An interesting ceremony took place last Thursday week in connection with the water-works of the Didcot and Hagburne District Council, when a large water-supply tank on pillars some 30 feet high, erected by Messrs. J. Firth Blakeley and Co., of Dewsbury, was formally opened by Mrs. T. Latham, wife of the Chairman of the Council. The tank (which is entirely of steel, made from ⅜-inch plates) is 22 feet square by 10 ft. 6 in. deep. It is carried on steel girders and strong cast-iron pillars, and is surmounted by a corrugated roof.

A New Pumping-Station for Clevedon.—A new pumping-station for the Clevedon Water Company has just been opened by Lady Elton. It stands on about half-an-acre of ground, and consists of an engine-room, boiler-house, coal-store, fitting-shop, and foreman's cottage. The buildings are of local pennant stone, with bath stone dressings. The engines are of the vertical double expansion type, with a lifting power of 30,000 gallons per hour. The water is pumped to the top of Dial Hill reservoir, about 2 miles distant; and from this the town is supplied by gravitation. The Engineer was Mr. James Mansergh.

The London County Council and the Settlement with the Gaslight and Coke Company.—At the meeting of the London County Council to-day, the Parliamentary Committee will present a long report on the result of the negotiations which culminated in the settlement of the differences between the Council and the Gaslight and Coke Company, and the withdrawal of the Council's Bill, opposing that of the Company, to which reference is made in our editorial columns. The proposals in the two Bills are set out in tabular form in the report, and side by side with them the amendments effected. The whole position is thus seen at a glance. The Committee point out that in arriving at this settlement they have "obviated what would probably have been a long and costly contest before the Select Committee;" and they recommend the Council to approve of the course taken.

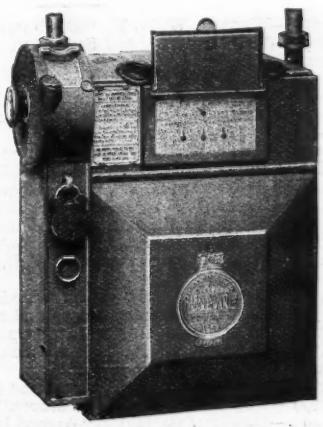
Allocation of Gas Profits at Marsden.—The Marsden Gas Committee having recommended that as from Oct. 1 next the price of gas should be reduced 2d. per 1000 cubic feet for both lighting and heating, that all extensions at the gas-works in future should be paid for out of a capital sum borrowed for the purpose, and that a grant should be made from the profits to the credit of the general district fund, some discussion on the subject took place at the last meeting of the Urban District Council. Mr. Robinson contended that they should endeavour to pay off the loan on the works, which would then belong absolutely to the town. The present price of 2s. 8d. per 1000 cubic feet was lower than that of any other gas-works of the same size in the kingdom; and this he attributed to good management and the small amount of capital sunk. He deprecated the borrowing of money for extensions, and thought it ought to be their policy to reduce the loan and get a reserve of at least £2000. Mr. Firth pointed out that they had thirteen years yet in which to repay the borrowed money. The gas-works themselves were practically a reserve fund; and the loan was already almost extinct. Mr. Robinson replied that if they took the profits in relief of the rates, they would not have the same inducement as they now had to keep down the rates. Besides the gas-works had for many years relieved the rates by supplying gas for the public lamps at a very low charge. The recommendation of the Committee was, however, agreed to. The report of the Manager (Mr. Arthur Halliwell) stated that during the twelve months ending March 31, there was an increase of 12·03 per cent. in the quantity of gas sold; the balance on revenue account being £229.

Regarding the recent reduction in the price of gas for power purposes at Nottingham, a "Working Man" sends the following query to a local paper: "Seeing your note as to the price of gas for power purposes, I should be very pleased if you could assist my faint knowledge in this respect. Does the manufacture of gas for power purposes at 1s. 6d. pay? If it does, why should I be called upon to pay 2s. 8d.? And if it does not pay at 1s. 6d., why should I help to pay for running other people's gas-engines for profit-making purposes—that is, why must I pay 2s. 8d. so that gas-engine users can have it at 1s. 6d.?" A user of gas for power purposes wrote pointing out that it was much better for the Corporation to compete with the producer-gas plants now on the market, and make a small profit, rather than lose many of their larger accounts; and that it should not be forgotten that the labour of taking the state of the meter, collecting, &c., was very much less with large consumers of gas than with small ones. Then, again, most power users would only require their engines to run during the day, when the ordinary consumer was not using gas. He added: "It is possible now for a small gas-engine user to make his own gas at a cost of 0·6d. per indicated horse power per hour, and in large engines at 0·53d. per indicated horse power per hour, as against our Corporation estimate of 1d. per hour per horse power. To put it more plainly, I am running a 60-horse power engine, and use 22,000 cubic feet per week. I take gas from the Corporation at 1s. 6d.; but with several of the gas-producing plants on the market, at an initial cost of £250 to £350, according to the plant I choose, I can produce gas at a cost of from 8·75d. to 9·6d. per 1000 cubic feet."

PARKINSON'S

FOR QUOTATIONS FOR

SLOT INSTALLATIONS



WRITE—

PARKINSON AND W. & B. COWAN, LTD.,
(PARKINSON BRANCH)
LONDON AND BIRMINGHAM.

The Coalville Urban District Council have placed an order with Messrs. R. Dempster and Sons, Limited, of Elland, for new exhausters and condensers.

The South Metropolitan Gas Company have agreed with the London County Council to divert their gas-mains in connection with the construction of the Rotherhithe Tunnel for the sum of £300.

The Draycott Gas Company have placed an order with Messrs. C. & W. Walker, Limited, of the Midland Iron-Works, Donnington, Salop, for four Milbourne's patent purifiers 10 feet square, to be erected at their works. Messrs. Walker have just completed a set of purifiers on the same system at the Bangor Gas-Works, Ireland.

By an announcement which appears in another part of the "JOURNAL," it will be seen that the Wakefield Gas Company are inviting tenders for £20,000 of 4½ per cent. preference stock, authorized to be raised at an extraordinary meeting held on the 5th inst. The position of the Company may be estimated from the fact that dividends at the rate of 11½ per cent. per annum have been paid on the original shares for the past fourteen years. The stock is offered at a minimum price of £110 per cent.

By an announcement appearing in another part of the "JOURNAL," it will be seen that the Wadhurst, Ticehurst, and District Gaslight and Coke Company, who obtained parliamentary power last year to purchase the gas-works at Ticehurst, established in 1868, are about to issue at par 3500 of the 5000 shares of £5 each into which their capital is divided. They rank for dividend up to 10 per cent.; and the vendor guarantees 4½ per cent. for one year from the 1st prox., pending the laying of additional mains and the enlargement of the works—improvements which are expected to take only nine months to carry out. The rateable value of the Company's area is £61,439, the population being 11,343; and the district is one of great natural beauty. The subscription list will close next Monday.

According to "The Times," the Welsbach Company's reconstruction scheme is not to pass without opposition from holders of the preference stock. Considering how much these persons give up, for the sake of peace and to avoid delay, to other classes of stockholders who have no rights whatever while the arrears of preference interest are unpaid, this is not surprising. The United States Debenture Corporation, Limited, which holds £10,650 of the Welsbach preference stock, has issued a circular asking for proxies to be used at the meeting this week. The Board of the Merchants' Trust has associated itself with this protest. The circular, after explaining the position of the preference stock, says: "The Directors of the Welsbach Company recommend this scheme on the ground that the depreciation in the assets of, and loss of capital by, the Company prevent their recommending any distribution of the trading profits, because they would be personally liable if, in face of such depreciation, they should pay any dividend. My Board has taken the opinion of eminent Counsel on this point, and he advises that the existing depreciation and loss of capital do not prevent a distribution of trading profits, and that the Directors would, therefore, be perfectly justified, and would incur no personal liability, in recommending a distribution of such profits. . . . If this contention is carried to its logical conclusion, the Directors would be bound, if no reduction of capital is effected, to retain all trading profits until the existing depreciation (say £2,000,000) is made good; leaving the Company with its present assets and about £2,000,000 of cash for which it would have no use—a position which shows the unsoundness of the Directors' views." The action of the Board has the practical effect of coercing the preference shareholders into consenting to a surrender of their undoubted rights by the fear that they will be kept without dividends for a considerable period.

APPLICATIONS FOR LETTERS PATENT.

10,018.—WEBBER, W. H. Y., "Discharging gas-retorts." May 4.
10,038.—DEMPSTER, R., and SONS, LTD., and BROADHEAD, J. W., "Quenching hot coke." May 4.
10,046.—CLEGG, W. H., "Gas-motor." May 4.
10,056.—NEHMER, F., "Lighting gas." May 4.
10,086.—MILLS, B. J. B, "Gas-regulators." A communication from "Air-Fire." May 4.
10,184.—MILLS, B. J. B., "Incandescent gas-burner." A communication from Tachon, Joatton, and Co. May 5.
10,186-89.—HINMAN, C. W., "Air and gas mixers." May 5.
10,191.—SMITH, T. B., "Inverted incandescent lamps." May 5.
10,192.—SNELL, A. B., "Means for illuminating." May 5.
10,200.—HARTELL, A. E., "Gas-lamps." May 5.
10,326.—WEST, J., and CARPENTER, W. J., "Retort-charging scoops." May 6.
10,327.—FREY, A., "Chimney for incandescent gas-lamps. May 6.
10,364.—FLETCHER, RUSSELL, and Co., LTD., and FLETCHER, T. & W., "Atmospheric gas-burner for heating purposes." May 7.
10,365.—EHMANN, C. P., and MORTON, F., "Atmospheric gas-burners." May 7.
10,376.—ZECHNALL, L., "Incandescent gas-burner." May 7.
10,399.—GUIMARAES, J., "Gas burners." May 7.
10,465.—DUNNEMANN, H. C., "Argand lamps or burners." May 8.
10,499.—ANDERSON, D., "Incandescent gas-burners." May 8.
10,500.—TATHAM, J. E., CHAMBERLAIN, J., and HANDS, H., "Burning low-grade gases for heating purposes." May 8.
10,527.—BLAU, H., "Oil gas of high combustible value." May 8.
10,528.—PRESCOTT, A. P., "Gas-engines." May 8.
10,530.—BURROWS, J. N., "Frame-ring for gas-lamp." May 8.
10,551.—CROIX, X. DE LE, "Gas burners and purifiers." May 8.
10,587.—SHEPPARD, W. D., "Boiler for gas cooking-stove." May 9.
10,597.—MEININGHAUS, E., "Simultaneous production of heating and lighting gas." May 9.
10,599.—WILLIS, C., and BATES, A., "Acetylene gas generators and lamps." May 9.
10,624.—PEARSON, R., "Manufacture of lime and fuel gas." May 9.

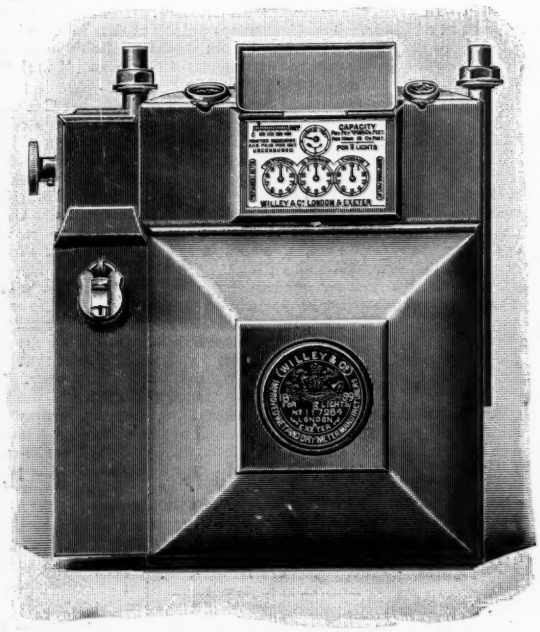
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and Cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LONDON AND EXETER.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

DRAUGHTSMAN. No. 4035.
ENGINE DRIVER AND ENGINE FITTER. No. 4036.
MANAGER FOR COMPRESSED GAS-WORKS. No. 4031.
MANAGER GAS FITTING, &c., COMPANY. No. 4030.
WATER INSPECTOR. Mid Kent Water Company.
WATER METER INSPECTOR, &c. Mid Kent Water Company.
WORKING FOREMAN. Devizes Gas Department.

Situations Wanted.

CLERK, &c. No. 4033.
GAS MANAGER, &c. No. 4037
SECRETARY AND MANAGER OR OUTDOOR SUPERINTENDENT. No. 4034.
TRAVELLER GAS ENGINEERING FIRM. No. 4032.
TRAVELLER GAS-STOVE TRADE. W. W. Faversham.

Business for Disposal (By Auction).

GAS APPLIANCES COMPANY. London, May 28 and 29.

Plant, &c., for Sale.

EXHAUSTER (Small). Littleborough Gas-Works.
METERS (2 and 3 light wet). Blackburn Gas Department.
SCRUBBER, WASHER, STATION METER, EXHAUSTER, TANKS, CONDENSERS, MOUTHPIECES, LANTERNS, &c. Longwood Gas Company.
STEAM-ENGINES, HYDRAULIC MAINS, &c., AND PUMPS (Tar and Liquor). Arbroath Gas-Works.
VALVES, GOVERNOR, HYDRAULIC MAINS, &c. Hamilton Gas-Works.

Plant (Second-Hand) Wanted.

PURIFIERS. Queenstown Gas Company.
STATION METER AND GOVERNORS. Marlborough Gas Company.

Meeting of Company.

MALTA AND MEDITERRANEAN GAS COMPANY. June 4.

Prospectus.

WADHURT, TICEHURST, AND DISTRICT GAS LIGHT AND COKE COMPANY. List closes May 25.

Sales of Stocks and Shares.

CHIGWELL, LOUGHTON, &c., GAS COMPANY. May 26.
HASTINGS AND ST. LEONARDS GAS COMPANY. June 9.
LOWESTOFT WATER AND GAS COMPANY. May 26.
SOUTHEND GAS COMPANY. May 26.
WAKEFIELD GASLIGHT COMPANY. June 8.
WEST HAM GAS COMPANY. June 16.

TENDERS FOR

Ammonia (Muriate).
SMITH'S AGENCY. Manchester.

Ammoniacal Liquor (*See* "Tar").

Benzol.
STRETFORD GAS COMPANY. Tenders by May 26.

Coal and Cannel.
ASHTON-IN-MAKERFIELD. Tenders by June 2.
BRIGHOUSE GAS DEPARTMENT. Tenders by May 30.
BUXTON GAS DEPARTMENT. Tenders by June 13.
CANTERBURY GAS AND WATER COMPANY. Tenders by May 30.
CLITHEROE GAS DEPARTMENT. Tenders by May 30.
CROMER GAS COMPANY. Tenders by May 25.
DENBIGH GAS COMPANY. Tenders by May 25.
EAST DEREHAM GAS DEPARTMENT. Tenders by June 1.
EASTBOURNE GAS COMPANY. Tenders by June 1.
ELSECAR, &c., GAS COMPANY. Tenders by May 28.
EXMOUTH GAS COMPANY. Tenders by May 30.
FARNHAM GAS COMPANY. Tenders by May 30.
GLOUCESTER GAS COMPANY. Tenders by June 1.
HEREFORD GAS DEPARTMENT. Tenders by May 30.
HINCKLEY GAS DEPARTMENT. Tenders by May 27.
KILDWICK GAS COMPANY. Tenders by June 1.
LEICESTER GAS DEPARTMENT. Tenders by May 31.
LITTLEHAMPTON GAS COMPANY. Tenders by June 1.
LLANDUDNO GAS DEPARTMENT. Tenders by June 6.
LURGAN GAS COMPANY. Tenders by June 1.
MANSFIELD GAS DEPARTMENT. Tenders by May 26.
NOTTINGHAM GAS DEPARTMENT. Tenders by May 25.
OLDHAM GAS DEPARTMENT. Tenders by June 2.
OXFORD GAS COMPANY. Tenders by June 6.
SEDGLEY GAS DEPARTMENT. Tenders by June 4.
SHREWSBURY GAS COMPANY. Tenders by June 13.
SKIPTON GAS DEPARTMENT. Tenders by May 27.
SOWERBY BRIDGE GAS DEPARTMENT. Tenders by May 25.
STOCKTON GAS DEPARTMENT. Tenders by May 21.
STRETFORD GAS COMPANY. Tenders by May 26.
SUTTON, SOUTHCOATES, &c., GAS COMPANY. Tenders by May 26.
SWADLINCOTE GAS DEPARTMENT. Tenders by May 26.
TAUNTON GAS COMPANY. Tenders by June 1.
TORQUAY GAS COMPANY. Tenders by June 9.
TYLDESLEY-WITH-SHAKERLEY. Tenders by June 2.
ULVERSTON GAS DEPARTMENT. Tenders by May 28.
WARRINGTON GAS DEPARTMENT. Tenders by May 29.
WIDNES GAS DEPARTMENT. Tenders by May 29.
WOKINGHAM GAS DEPARTMENT. Tenders by May 26.

Fire-Clay Goods.
TYLDESLEY-WITH-SHAKERLEY. Tenders by June 2.

Gasholder.
CARLOW GAS COMPANY. Anderson, Westminster.

General Stores, Lead, Lead Piping, Steam Pipes, Brass Cocks, &c.
ASHTON-IN-MAKERFIELD. Tenders by June 2.
TYLDESLEY-WITH-SHAKERLEY. Tenders by June 2.

Lanterns, Columns, and Cradles.
ASHTON-IN-MAKERFIELD. Tenders by June 2.

Lime.
BRIGHOUSE GAS DEPARTMENT. Tenders by May 30.
HINCKLEY GAS DEPARTMENT. Tenders by May 27.
TYLDESLEY-WITH-SHAKERLEY. Tenders by June 2.

Meters.
ASHTON-IN-MAKERFIELD. Tenders by June 2.

Pipes and Fittings, &c.
ASHTON-IN-MAKERFIELD. Tenders by June 2.
MAIDSTONE GAS COMPANY. Tenders by May 27.
TYLDESLEY-WITH-SHAKERLEY. Tenders by June 2.

Purifiers.
QUEENSTOWN GAS COMPANY (New or Second Hand)
WIDNES GAS DEPARTMENT. Tenders by May 29.

Retorts.
TYLDESLEY-WITH-SHAKERLEY. Tenders by June 2.

Retort Carbon.
ARBROATH GAS COMPANY.

Sulphuric Acid.
HINCKLEY GAS DEPARTMENT. Tenders by May 27.

Tar and Ammoniacal Liquor.
ASHTON-IN-MAKERFIELD. Tenders by June 2.
BUXTON GAS-WORKS. Tenders by June 13.
HINCKLEY GAS DEPARTMENT. Tenders by May 27.
LONGTON GAS DEPARTMENT. Tenders by May 26.
MANSFIELD GAS DEPARTMENT. Tenders by May 26.
NEWCASTLE-UNDER-LYME GAS DEPARTMENT. Tenders by May 25.
SKIPTON GAS DEPARTMENT. Tenders by May 27.
STRETFORD GAS COMPANY. Tenders by May 26.
SUTTON, REIGATE, AND NEWHAVEN GAS-WORKS Tenders by June 3
SWADLINCOTE GAS DEPARTMENT. Tenders by May 26.
TYLDESLEY-WITH-SHAKERLEY. Tenders by June 2.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.,

JOHN WM. O'NEILL, Managing Director,

PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, Broad Street, London, Palmerston House, Old Volcanism, London."

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

IT is worth your while to buy direct. THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY, London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Subastral," London; A.B.C. Code used. Telephone No.: Avenue 5891.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
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DUTCH OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty (First Dutch Bog Ore Company, Ltd.), ROTTERDAM.
General Manager for England and Wales—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.
GRAND Cycle Bargains, new and second hand "HUMBERS," "PREMIERS," "COURT ROYALS," "CENTAURS," "RUDGE-WHITWORTHS," "SWIFTS," "ROVERS," &c., on SPECIAL TERMS to Gas and Water Officials. Easy payments from 10s. monthly.
IMPERIAL CYCLE SUPPLY CO., COVENTRY.

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

COAL GAS TAR wanted.
Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered, either on Fixed or Sliding Scale Basis.
State Quantity to offer for Prompt and Forward Delivery.
The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE CEMENT, PAINT, GAS COAL.

BALE & CHURCH, 5, CROOKED LANE, LONDON, E.C

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

STREET AND SHOP LAMPS AND LANTERNS.
MARK DUFFIELD & SONS (Established 200 Years), Makers of Street and Shop Lamps to own Pattern and Design. Any description of Lamp made. Inquiries invited.
London Manager: EDWARD PADFIELD, West India House, 96 & 98, LEADENHALL STREET, E.C.
Telegraphic Address: "EUPATHY, LONDON."

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

NOW Ready. Price 6d.—"Analyses of BRITISH COALS AND COKE COLLECTED AND COMPARED." Part I.—Northumberland, Durham, and Yorkshire. (Reprinted from the Colliery Guardian.)
THE COLLIERY GUARDIAN CO., LTD., 49, Essex Street, Strand, LONDON, W.C.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

THE EVESON COAL AND COKE COMPANY LIMITED, BIRMINGHAM,
ASK for Prices of Gas Coke in any quantities, delivered into waggons at Sellers' Station.

GAS-METERS wanted, old disused Wet. Copper Lamp Frames, Brass, Pewter, Tin, Zinc, Lead Ashes, Old Copper Electric Cable, &c., for Cash.
J. SMITH, Canal Road, BRADFORD.

SON of a Gas Manager, thoroughly experienced in Gas Manufacturing, also well trained in all branches of Electrical Engineering, would like a situation at home or abroad. Educated in three different Languages.
Address, No. 4037, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TRAVELLER, with good connection in South-Eastern Counties, lately representing good Firm, desires re-engagement. Excellent References. Age 27.
Address W. W., 83, Preston Street, FAVERSHAM.

TRAVELLER is shortly Open to an ENGAGEMENT with a firm of Gas Engineers and Contractors. Extensive connection and can introduce good business.
Address No. 4032, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AN energetic Man holding a position as Secretary and Manager would like to TAKE CHARGE of a 10 million to 20 million Works, or to act as Outdoor Superintendent. Life Abstainer. Age 34. Excellent Testimonials. Eight Years in present situation.
Address No. 4034, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A GENTLEMAN (Age 30), with Twelve Years' experience in a leading Gaslight Company—Correspondence (Shorthand), Rentals, Stock-Ledgers, Transfers, Shares, Board Records, Dividends, &c., &c.—desires an APPOINTMENT in or about London. Highest Testimonials. Personal References. Salary £100 per annum. One Month's Approbation.
Address No. 4033, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WATER-METER Inspector and Repairer Wanted, accustomed to Kennedy and Siemens Meters. Must have own cycle, as district is wide.
Send Particulars of Experience and Salary required to MID-KENT WATER COMPANY, Snodland, KENT.

WANTED, an Experienced Man as ENGINE DRIVER and ENGINE FITTER. Must understand Gas Engines, Elevating, and Conveying Plant.
Apply, by letter, to No. 4036, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED by a firm of Constructional Gas Engineers, a competent DRAUGHTSMAN. Permanent situation to suitable Man.
Apply, by letter, stating full Experience and Salary required, to No. 4035, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Gentlemanly Representative, thoroughly experienced in all branches of In and Out Door Gas Lighting, capable of taking ENTIRE CHARGE of the Business of an Old-Established House in London. Only First-class men need apply.
Apply, by letter, stating Salary required, Age, and Experience, to No. 4030, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MANAGER Wanted for Compressed Gas-Works in Glasgow, making Oxygen, Carbonic Acid, Nitrous Oxide, Glauber's Salt, and Valves for Gas Bottles. Must be a thoroughly Trained Chemist, preferably with a science degree, and be accustomed to the management of men and the erection of machinery and plant.
State Age, Experience, and Salary expected, and send References and *copies* of Testimonials. All communications will be treated in strict confidence.
Address No. 4031, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED a Capable and Trustworthy Man as WATER-INSPECTOR. Must be thoroughly practical, able to estimate correctly, and qualified to inspect plumbers' work. Will be required to canvass for orders. Must have cycle.
Apply, giving fullest Particulars of previous employment, with *copies* only of recent Testimonials, and stating Wages required, to the MID KENT WATER COMPANY, Snodland, KENT.

WANTED A WORKING FOREMAN.
THE Gas and Water Committee of the Devizes Urban District Council are in want of a man who is willing to make himself generally useful as WORKING FOREMAN in their Gas-Works. It is desirable that he should have a knowledge of Fitting work, and be capable, under superintendence, of doing any such work about a Gas-Works. It is necessary that he should have a knowledge of Carbonizing and Carbonizing Plant, Purifying, and all other Gas-Works routine.
Apply, stating Age and Wages required, to
J. W. HOLLOWAY,
Manager.
Gas Works, Devizes, Wilts.

WANTED, Rough Muriate of Ammonia. About four tons monthly.
Address "A 122," Smith's Advertising Agency, Blackfriars Street, MANCHESTER.

NARBOROUGH, &c., GAS COMPANY, LIMITED.
WANTED, a Second-Hand Station METER, to pass 7000 cubic feet per hour, with Bye-Pass, &c., complete.
Also Two Second-Hand 7-inch GOVERNORS, with Valves, Bye-Passes, &c., complete.
Must be guaranteed in perfect condition.
T. E. BONSHOR,
Secretary.
Gas Offices Whetstone, near Leicester.

TO BE SOLD—Purifiers, Two or Four, 10 feet square by 4 ft. 6 in. deep, planed Joints, Connections, and Overhead Girders.
Write J. WRIGHT, 181, QUEEN VICTORIA STREET, E.C.

FOR SALE—Four 9 feet square Purifiers, complete with 8-inch Centre-Valve, Connections, and Lifting Apparatus. In very good condition. Can work three or four Purifiers as desired. Can be seen at work.
For further Particulars, apply to J. DAVIES, Gas-Works, NANTWICH.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE—Very good Gas Plant as under:—
PURIFIERS—Four 12 feet square, with 8-inch Centre-Valve and Connections. Planed Joints.
Kirkham WASHER-SCRUBBER, 300,000 cubic feet per diem, with Engine and 8-inch Valves and Connections.
Livesey WASHER, 250,000 cubic feet per diem, with 8-inch Valves and Connections.
Photos. sent on application to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

COUNTY BOROUGH OF BLACKBURN.
(GAS DEPARTMENT.)
THE Gas Committee are open to receive OFFERS for a quantity of Second-Hand Two and Three Light WET METERS, and are prepared, if required, to put all, or part, into proper working order, and have same officially tested and stamped.
All offers to be addressed to
S. R. OGDEN,
Engineer and Manager,
Municipal Offices: Blackburn,
May 8, 1903.

EXHAUSTERS, ENGINES, &C., FOR SALE.
WE have upwards of Thirty EXHAUSTERS of various descriptions and sizes FOR SALE, which have been overhauled and guaranteed in perfect working order. Engines provided, with all Fittings, Governors, and at least one-third less than the new price. Photographs and full Particulars submitted.
J. FIRTH BLAKELEY and Co., Thornhill, DEWSBURY.

SCRUBBERS and Washers for Sale.—
TOWERS 8 ft. by 60 ft., 6 ft. by 28 ft.; several smaller.
"Livesey" WASHER, 10-inch Connections.
"Holmes" Patent WASHER-SCRUBBER 10-inch and 12-inch Connections.
Cheap for immediate Sale. Erected if required.
J. FIRTH BLAKELEY & Co., DEWSBURY.

HAMILTON CORPORATION GAS-WORKS.
FOR SALE—A number of 10 inch, 12-inch, and 15-inch Rack and Pinion VALVES, and one 12-inch Foulis GOVERNOR complete; also three lengths of ▭ shaped M. I. HYDRAULIC MAIN, with Dip Pipes and Flanged Stools for settings of four and two retorts. All recently removed owing to extensions.
Particulars from, and offers to,
J. BALLANTYNE,
Engineer and Manager.

EXHAUSTER.
ANDERSON'S Vertical Exhauster on SALE. Suitable for Small Works.
Apply to the MANAGER, Gas-Works, LITTLEBOROUGH.

RETORT CARBON.
ABOUT 8 Tons for Sale, on rail at Arbroath Station.
Offers to Arbroath Gas Corporation, marked "Tender for Carbon" on envelope, to be addressed to Mr. ALEXR. C. YOUNG, Manager, Arbroath Gas-Works.

HYDRAULIC MAINS.
SEVERAL Lengths of Good Steel MAINS, 21 in. by 2 in., in about 7 ft. to 8 ft. 6 in. lengths, with two end plates and one 10-inch valve.
Inquiries and Offers to Mr. ALEXR. C. YOUNG, Gas Manager, ARBROATH.

PUMPS.
FOR SALE, Twelve Pumps, Tar and Liquor, in three batteries of four Pumps each, with Shafting, Belting, &c., to be seen working at the Arbroath Gas-Works.
Apply to Mr. ALEXR. C. YOUNG, Gas Manager, ARBROATH, for further particulars.

STEAM-ENGINES FOR SALE.
TWO very fine 32 nom. horse power noncondensing ENGINES, by Shanks and Son, Arbroath. Horizontal girder type, in first-class order, nearly as good as new, arranged to work singly or both together. Cylinder 12½ inches diameter by 25-inch stroke. Fly-wheel 6 ft. 10 in. diameter by 9 in. wide. Centrifugal spring governor. Working pressure 80 lbs. May be sold singly if desired. Complete with steam and exhaust pipes. Can be seen working at Arbroath Gas-Works.
Offers to, and further Particulars from, Mr. ALEXR. C. YOUNG, Gas Engineer, ARBROATH.

GAS PLANT FOR SALE.
OWING to the acquirement of the Works of the Colne Vale Gas Company, and the closing down of these Works, the Longwood Gas Company have FOR SALE the following PLANT in good condition:—
One HOLMES' TOWER SCRUBBER, 5 ft. by 12 ft., mounted on Thurston's Square Tar-Extractor, 5 ft. 6 in. by 5 ft.
One HOLMES' WASHER, cylindrical, 16 ft. by 4 ft. 6 in., with Rope Driving Gear and Shaft.
One COWAN CYLINDRICAL STATION METER, measuring 6 ft. 6 in. by 6 ft., with 12-inch Connections; capacity 10,000 feet per hour.
One 5000 cubic feet per hour EXHAUSTER, with Accessories and Engine in duplicate.
One 500-light STATION METER.
One Wrought-Iron Cylindrical STORAGE TANK, 26 ft. by 7 ft.
One Cast-Iron STORAGE TANK, 6 ft. 6 in. by 5 ft. by 5 ft., with Cast-Iron Draw-Off Cock.
Six Cast-Iron CONDENSERS, each 9 ft. 6 in. high, and 2 ft. diameter, with square base, 17 ft. by 3 ft by 1 ft. 3 in., fitted with Cleaning-Out Lids for each Pipe.
The following MOUTH-PIECES, with Ascension and Dip Pipes to suit:—
28 OVALS, 18 in. by 14 in.
Seven OVALS, 18 in. by 15 in.
27 ▭ 21 in. by 15 in.
Two Cast-Iron SLAKING TROUGHS, 4 ft. by 2 ft. 6 in. by 2 ft.
Also 100 Second-hand STREET LANTERNS.
Inspection invited.
Further Particulars on application to
J. H. BREARLEY,
Gas Engineer.
Longwood.

CARLOW GAS COMPANY (IRELAND).
TENDERS invited for a 60 feet Gas-HOLDER.
Plan and Specification obtainable from the undersigned on payment of One Guinea.
R. BRUCE ANDERSON, Assoc.M.Inst.C.E.,
35A, Great George Street,
Westminster, S.W.

THE East Dereham Urban District Council are prepared to receive TENDERS for the supply of about 1400 tons of screened GAS COAL for the ensuing Year.
Conditions and Forms of Tender to be had of the undersigned; and Tenders should be sent in by the 1st of June, 1903, endorsed "Tender for Coal."
B. H. VORES,
Clerk to East Dereham Urban District Council.
May 12, 1903.

TAUNTON GASLIGHT AND COKE COMPANY
THE Directors are prepared to receive TENDERS for the supply of COAL over One or Two Years from the 1st of July next.
Particulars may be obtained from the undersigned.
Sealed Tenders will be received up to the 1st of June next.
A. EDWARDS,
Secretary and Manager.
May 16, 1903.

DENBIGH GAS AND COKE COMPANY, LIMITED.
TENDERS are invited for the supply of 1200 Tons of MAIN GAS COAL, to be delivered to Denbigh Station.
Tenders are to be sent in on or before Monday, the 25th of May, 1903.
The lowest or any Tender not necessarily accepted.
W. EWART BROCK,
Manager and Secretary.
Gas-Works, Denbigh, N. Wales.

TENDERS are invited by the Directors of the Elsecar, Wentworth, and Hoyland Gas Company for the supply of 3300 tons of Best Screened GAS COAL or NUTS, delivered at Elsecar G.C. Railway Station, for the Twelve Months ending the 30th of June, 1904.

Tenders to be addressed to Mr. WM. STENTON, Manager, Gas-Works, ELSECAR, near Barnsley, by the 28th inst.

HINCKLEY URBAN DISTRICT COUNCIL.

THE Gas Committee invite Tenders for the supply of COAL, LIME, and SULPHURIC ACID; and also for the purchase of TAR.

Full Particulars and Form of Tender may be obtained from Mr. Fred. Lee, Gas Manager.

Endorsed Tenders to be sent to me not later than Wednesday, May 27, 1903.

A. S. ATKINS,
Clerk.

Hinckley, May 14, 1903.

THE Directors of the Kildwick Parish Gas Company invite TENDERS for the supply of the whole or part of 4000 Tons of GAS COAL, to be delivered free in the Company's Siding at Kildwick, during the Twelve Months ending June 30, 1904.

Tenders to be sent in not later than June 1, 1903, to

FRED. H. PICKLES,
Manager and Secretary.

Gas-Works, Kildwick,
May 15, 1903.

BOROUGH OF WOKINGHAM.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for 1600 Tons of good, screened GAS COAL for the Year ending May, 1904.

Tenders, endorsed "Tender for Coal," addressed to the Chairman, to be sent in not later than the 26th inst.

A. G. BATES,
Manager.

Gas Offices, Wokingham.
May 16, 1903.

COUNTY BOROUGH OF OLDHAM.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for the supply of about 110,000 tons of COAL required by them during the Year ending the 30th of June, 1904.

Specifications and Forms of Tender can be obtained on application to Mr. Arthur Andrew, Gas and Water Offices, Oldham, to whom Tenders are to be sent on or before Tuesday, the 2nd of June, 1903.

A. NICHOLSON,
Town Clerk.

Oldham, May 16, 1903.

THE Gas Committee of the Corporation of Newcastle-under-Lyme, invite TENDERS for the purchase of their make of AMMONIACAL LIQUOR and Surplus TAR during the Twelve Months ending April 30, 1904.

Quantities: Tar, about 700 tons; Liquor Ammonia 1100 tons.

The Committee do not bind themselves to accept the highest or any Tender.

Tenders, endorsed "Tenders for Tar and Liquor Ammonia," to be sent to the Town Clerk on or before the 25th of May, 1903.

W. WINSTANLEY,
Manager.

LITTLEHAMPTON GAS COMPANY, LIMITED.

THE Directors of the above Company invite TENDERS for the supply of 3000 to 3500 Tons of GAS COAL, for delivery at Littlehampton Station or f.o.b., over a period of Nine Months commencing July 1 next.

Further Particulars and Form of Tender may be obtained on application to the undersigned, to whom Tenders should be sent, on or before June 1 next, endorsed "Tender for Coal."

A. W. FLTON.
Engineer and Manager.

COUNTY BOROUGH OF WARRINGTON.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of 30,000 Tons of COAL, SLACK, or NUTS, and 5000 Tons of CANNEL.

Forms of Tender and all Particulars can be obtained on application to Mr. W. S. Haddock, Gas Engineer.

Sealed Tenders must be delivered by Ten a.m. on the 29th inst.

FREEK. TAYLOR,
Secretary.

Gas Offices, Warrington,
May 15, 1903.

QUEENSTOWN GAS COMPANY.

PURIFIERS REQUIRED.

THE Directors of the above Company invite TENDERS for the supply of two PURIFIERS—either New or Second-hand, in good condition, 10 feet square by 4 feet 6 inches or 5 feet deep, with the necessary 9-inch Valves and Connections, Grids, and Lifting Apparatus complete.

The Purifiers to be delivered at the Works, and erected fit for use.

By order,
JAMES WILSON,
Secretary.

Offices: 2, Harbour Row, Queenstown,
May 15, 1903.

FARNHAM GAS COMPANY, LIMITED.

THE Directors of the above Company invite TENDERS for the supply of 3400 Tons of good, clean, fresh worked GAS COAL (screened and unscreened), delivered at Farnham Station (L. & S.W. Ry.) in such quantities and at such times as required during the Year ending May 31, 1904.

Forms of Tender may be obtained on application.

Tenders, endorsed "Coal," to be delivered to the undersigned not later than the 30th of May next.

S. J. SYMONDS,
Manager and Secretary.

Gas-Works, Farnham,
May 14, 1903.

LUTELESS PURIFIERS.

THE Widnes Corporation invite Tenders for the supply and erection of two luteless PURIFIERS, each 30 ft. by 25 ft. by 5 ft.

Prints of Plans and copy of Specification may be had on application to Mr. Isaac Carr, M.Inst.C.E., Widnes.

Tenders, endorsed "Purifiers" and addressed to the Chairman of the Gas and Water Committee, to be delivered at the Town Hall, Widnes, on or before Friday, the 29th inst.

The Corporation do not bind themselves to accept the lowest or any Tender.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes,
May 15, 1903.

THE Widnes Corporation are prepared to receive TENDERS for the supply of about 30,000 Tons of GAS COAL (Slack, "Through and Through," or Screened Coal) for the period ending the 30th of June, 1904, to be delivered at the Gas-Works, Widnes.

Conditions and Forms of Tender may be obtained from Mr. Isaac Carr, M Inst.C.E., Gas Engineer, Widnes.

Tenders, endorsed "Gas Coal," to be delivered to the undersigned not later than Noon of Friday, the 29th inst.

The Corporation do not bind themselves to accept the lowest or any Tender.

H. S. OPPENHEIM,
Town Clerk.

Town Hall, Widnes.
May 15, 1903.

CANTERBURY GAS AND WATER COMPANY.

TENDERS FOR GAS COALS.

TENDERS are invited for the supply of 14,000 tons of the best GAS COALS, to be delivered during One Year commencing on the 1st of July next.

Forms of Tender, containing Particulars and Conditions of the Contract, may be obtained on application to the undersigned.

Sealed Tenders, endorsed "Coals," to be delivered at the Company's Offices, Castle Street, Canterbury, on or before Saturday, the 30th of May inst.

By order,
JAMES BURCH,
Secretary and General Manager.

May 11, 1903.

BOROUGH OF CLITHEROE.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee invite Tenders for the supply of 3000 Tons of screened GAS COAL, 1000 Tons of SLACK, and 500 Tons of CANNEL, to be delivered on the Gas-Works Siding during the Year ending June 30, 1904.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Gas Coal," addressed to the Chairman of the Gas Committee, to be delivered at my Office on or before Saturday, the 30th of May, 1903.

ROBT. BARRETT,
Manager.

Gas-Works, Clitheroe,
May 15, 1903.

TO COAL CONTRACTORS AND OTHERS.

THE Sedgley Urban District Council invite TENDERS for supplying 750 to 1000 Tons of GAS COAL, the deliveries to be made at the Shut End Siding, at such times and in such quantities as may be directed.

It is desirable that a Statement of Analysis of the quality of a sample of the Coal to be supplied be sent with the Tender.

Sealed Tenders, marked "Coal," must reach me on or before the 4th of June, 1903.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
JOSEPH SMITH,
Clerk to the Council.

Offices: High Holborn,
Sedgley, May 15, 1903.

THE Directors of the Sutton, Southcoates, and Drypool Gas Company, Hull, invite TENDERS for the supply of 18,000 Tons of BEST SILKSTONE GAS COAL, stating price per ton for each of the following descriptions: Screened, Unscreened, and Cobbles, for delivery during the year ending the 31st of May, 1904, in North Eastern Railway Company's waggons into this Company's Siding, Dansom Lane, Hull.

The lowest or any Tender will not necessarily be accepted.

Sealed Tenders to be sent addressed to the undersigned before Twelve o'clock noon on Tuesday, the 26th of May, 1903, marked "Tender for Coal,"

By order,
DAVID WOOD,
Secretary.

Offices: St. Mark's Street,
Hull, May 8, 1903.

THE SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gaslight Company invite TENDERS for the supply of about 16,000 Tons of Screened GAS COAL, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the Year commencing July 1, 1903, and ending June 30, 1904.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any Tender.

Tenders must be made on Forms (containing further Particulars) which may be obtained on application at the Company's Works, or by post, and must be sent to the undersigned, on or before the 13th day of June, 1903.

By order.
WM. BELTON, Assoc.M.Inst.C.E.
Secretary and Manager.

Gas-Works, Shrewsbury,
May 13, 1903.

TO TAR AND LIQUOR CONTRACTORS.

THE Directors of the under-mentioned Gas Companies are prepared to receive TENDERS for the Purchase of all the surplus TAR for the Twelve Months ended June 30, 1904:—

At Sutton (Surrey), 160,000 gallons or thereabouts.
" Reigate " 60,000 " " "
" Newhaven (Sussex) 22,000 " " "

And for LIQUOR for Six or Twelve Months as may be found convenient.

The amount of Liquor for disposal for the year ending June 30, 1904, will be approximately 500,000 gallons, divided proportionately between the three Companies.

Particulars and Forms of Tender can be obtained on application at the Gas Office, Sutton, Surrey, and Tenders must be delivered on or before Wednesday, June 3 next, endorsed "Tenders for Tar and Liquor."

GEO. MEAD ROBINS,
Engineer.

Gas Offices: Sutton, Surrey,
May 11, 1903.

CITY OF HEREFORD.

THE Gas Management Committee of the Corporation invite TENDERS for the supply of best screened large GAS COAL for One Year, from the 1st of August next, to be delivered free at the Gas-Works Siding, Hereford, in such quantities as may be required from time to time.

The estimated quantity required will be about 11,000 Tons.

Full Particulars and Printed Forms of Tender may be obtained on application to the undersigned.

Tenders, endorsed "Tender for Gas Coal," are to be sent in addressed to the Chairman, Gas Management Committee, Mansion House, Hereford, by Saturday, May 30.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM PARLBY,
Gas Engineer and Manager.

Gas-Works, Hereford,
May 14, 1903.

BOROUGH OF BRIGHOUSE.

TENDERS FOR GAS COAL, SCREENED NUTS, CANNEL AND LIME.

THE Gas Committee are prepared to receive TENDERS for the supply and delivery of GAS COAL, SCREENED NUTS, CANNEL, and BUXTON LIME, required at the Mill Lane and Birds Royd Gas-Works during the Year ending June 30, 1904.

Specification and Form of Tender can be obtained on application at the Gas Engineer's Office, Mill Lane, Brighouse.

Sealed Tenders, stating price per ton delivered at the Gas-Works, or alongside the Gas-Works by the Calder and Hebble Canal, or at the Brighouse Railway Station, must be sent in on or before Saturday, the 30th day of May, 1903, addressed to the Town Clerk, Municipal Offices, Brighouse, endorsed on the outside "Tender for Coal" or "Lime" as the case may be.

The lowest or any Tender not necessarily accepted.

By order.
JAMES PARKINSON,
Town Clerk.

Town Clerk's Office, Brighouse,
May 14, 1903.

TYLDESLEY-WITH-SHAKERLEY URBAN DISTRICT COUNCIL.

THIS Council invite Tenders for the supply, at the Gas-Works, Tyldesley, from the 1st of July next to the 30th of June, 1904, of the undermentioned articles:—

GAS COAL and CANNEL.
Cast-Iron Spigot and Socket PIPES (Gas and Water).
LEAD TUBING (tinned), Gas and Water.
PIG LEAD.
Best Buxton LIME.
14 Oval Clay RETORTS, FIRE-BRICKS, FIRE-CLAY, &c.
Also for LABOUR for setting on Generator Principle.

Tenders are also invited for the purchase of the surplus TAR and AMMONIACAL LIQUOR to be produced at the Gas-Works during the Year ending the 30th of June, 1904.

Further Particulars and Forms of Tender may be obtained on application to Mr. Ginman, Engineer, Gas-Works, Tyldesley.

Sealed Tenders, on authorized forms only, endorsed "Tender for———," to be sent to the undersigned not later than Tuesday, the 2nd day of June, 1903.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
WM. J. MATTHEWS,
Clerk to the Council.

Council Offices, Tyldesley, Manchester,
May 14, 1903.

TENDERS FOR COAL, SLACK, CANNEL, AND BENZOL.

THE Directors of the Stretford Gas Company invite TENDERS for the supply of screened and unscreened GAS COALS, GAS NUTS, GAS SLACK, CANNEL NUTS, and BENZOL, to be delivered during the next One, Two, or Three Years in Monthly quantities as may be required.

Sealed Tenders to be sent to the Chairman of the Company not later than Tuesday, May 26, 1903, endorsed "Tender for Coal," "Cannel," or "Benzol."

Form of Tender to be obtained from the Secretary, Gas-Works, Stretford.

The lowest or any Tender not necessarily accepted.

By order of the Board,
BENJAMIN HAYNES,
Secretary.

Stretford, May 13, 1903.

THE Stretford Gas Company are prepared to receive TENDERS for the surplus Gas TAR and AMMONIACAL LIQUOR produced at their Works (together or separately) for a period of One, Two, or Three Years, commencing July 1, 1903.

The Directors are prepared to make the contract on the sliding-scale basis, or otherwise.

Tenders to be sent in, addressed to the Chairman, endorsed "Tender for Tar, &c.," on or before Tuesday, May 26, 1903.

Form of Tender may be obtained from the Secretary.

The Directors do not bind themselves to accept the highest or any Tender.

BENJAMIN HAYNES,
Secretary.

Stretford, May 13, 1903.

CORPORATION OF LEICESTER.

GAS COAL.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the supply of COAL, COBBLES, or NUTS (about 160,000 Tons), for the Twelve Months ending May 31, 1904.

Particulars and Form of Tender can be obtained upon Application to the Engineer.

Tenders, addressed to Mr. Councillor Edwards, Chairman, and endorsed "Tender for Gas Coal," to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, May 23, 1903.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M. Inst. C.E., M. Inst. E.E.,
Engineer and Manager.

Offices: Millstone Lane,
Leicester, May 8, 1903.

STOCKTON-ON-TEES CORPORATION.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Corporation invite TENDERS for the supply, in whole or part, of from 30,000 to 35,000 Tons of GAS COAL for the year ending March 31, 1904.

Tenders, sealed and endorsed "Tenders for Gas Coal," to be sent in not later than noon of the 21st day of May, 1903, addressed to the undersigned at the Gas-Works, Thompson Street, from whom Forms of Tender, &c., can be had.

The Gas Committee do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM FORD,
Manager.

Corporation Gas-Works,
Thompson Street, Stockton-on Tees,
May 7, 1903.

ULVERSTON URBAN DISTRICT COUNCIL.

TENDERS FOR COAL AND CANNEL.

THE Gas and Water Committee are prepared to receive TENDERS for the supply of best Screened GAS COAL and CANNEL during the ensuing One, Two, or Three Years, commencing the 1st of July next.

Parties tendering must give particulars of the Coal they propose to supply, and name the pit from which the same will be raised.

Further Information and Forms of Tender may be obtained on application to the undersigned.

Sealed Tenders, endorsed "Tender for Coal" or "Cannel," addressed to the Chairman of the Gas and Water Committee, to be sent in not later than the 28th inst.

The Committee do not bind themselves to accept the lowest or any Tender.

JNO. SWAN,
Engineer and Manager.

MAIDSTONE GAS COMPANY.

TENDERS FOR CAST-IRON PIPES.

THE Directors of the Maidstone Gas Company invite TENDERS for the supply and delivery of the undermentioned Socket and Spigot CAST-IRON PIPES, coated:—

5000 yards of 6-inch diameter Pipes.
7000 yards of 4-inch diameter Pipes.

Approximate weight of each size to be given, and quotations at per ton; Specials at per ton.

Tenders to be sent in on or before Wednesday, the 27th day of May, 1903, addressed to the Chairman of the Maidstone Gas Company, endorsed "Tender for Pipes."

The Directors reserve the right to accept the whole or part of any Tender, and do not bind themselves to accept the lowest or any Tender.

Delivery of the Pipes to be completed within Three Months from the date of acceptance of Tender, in such quantities and at such dates as may be required.

By order,
H. SMYTHE,
Engineer and General Manager.

Gas-Works,
Maidstone,
May 11, 1903.

TO COAL MERCHANTS, SHIPOWNERS, AND OTHERS.

THE Directors of the Torquay Gas Company are prepared to receive TENDERS for the supply of about 16,000 Tons (or such other quantity as may be agreed on) of best approved GAS COALS.

Tenders to state the price of the Coals, and the freight to Dartmouth or Torquay, separately and together, and also for delivery into the Company's Works, adjoining the Great Western Railway, free of all charges.

Further Particulars and Forms of Tender may be obtained from Mr. Bynon, the Manager of the Company, Hollacombe, Paignton; and Tenders are to be sent to the undersigned before the 9th day of June next.

JOHN KITSON,
Secretary.

Torquay, May 13, 1903.

EASTBOURNE GAS COMPANY.

TENDERS FOR COAL.

THE Directors are prepared to receive TENDERS for the supply of 25,000 Tons of Clean, Dry, Unscreened, Fresh-Wrought GAS COALS, delivered at Eastbourne Railway Station during the Year ending the 31st of August, 1904.

The deliveries to be in about equal monthly quantities.

Payment in cash monthly.

Parties desirous of tendering for more than one year may do so upon a separate form.

Particulars and Forms of Contract may be obtained from the Secretary.

The Directors do not bind themselves to accept the lowest or any Tender.

Tenders, sealed and endorsed "Tender for Coals," to be addressed to the Chairman of the Company, at the Offices, 10, Sussex Gardens, Eastbourne, on or before June 1 next.

By order,
JAMES S. GARRARD,
Secretary.

May 11, 1903.

CROMER, NORFOLK.

TENDERS FOR COAL.

THE Directors of the Cromer Gas Company are prepared to receive TENDERS, from Colliery Proprietors only, for the supply of from 2500 to 3000 tons of First-Class GAS COAL and NUTS to be delivered at the Company's Siding, Midland and Great Northern Railway Station, Cromer, between the 1st of July next and the 30th of June, 1904. Weight given to be stated.

Deliveries to be made in such quantities and at such times as may be required by the Company.

Payment, net cash monthly.

Sealed Tenders, endorsed "Tender for Coal," to be sent to the undersigned on or before the 25th day of May inst.

Forms of Tender are not supplied.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
P. E. HANSELL,
Secretary.

Cromer, May 16, 1903.

THE Llandudno Urban District Council invite TENDERS for the supply of 7000 tons of best screened GAS COAL, capable of producing a minimum of 10,000 cubic feet of 18-candle gas per ton, to be delivered, carriage paid, between the 1st of July next and the 30th of June, 1904, at the Llandudno Station of the London and North-Western Railway, in such quantities and at such periods as may be ordered from time to time.

Forms of Tender may be obtained on application to the undersigned, and only such Tenders as are upon the prescribed Form will be considered.

In every case where the particulars asked for are not given, the Tenders will be thrown out and not considered.

Tenders must be sent to the undersigned not later than the 6th day of June next.

The Tender of any person or firm who personally, or through an agent, canvasses any of the officers or members of the Council will be rejected.

The Council do not bind themselves to accept the lowest or any Tender.

(Signed) ALFRED CONOLLY,
Clerk to the Council.

May, 1903.

MANSFIELD CORPORATION.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL AND CANNEL.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

COAL.

THE Gas Committee are prepared to receive TENDERS for 200 Tons of CANNEL and 9000 Tons of best screened GAS COAL, delivered at Mansfield Station, for One Year from the 1st of June, 1903, to the 31st of May, 1904.

TAR AND LIQUOR.

Tenders for surplus TAR and LIQUOR made during the Year, from the 1st of July, 1903, to the 30th of June, 1904. Tenders for Liquor to be made either at a fixed price per Ton or on the Sliding-Scale regulated by the price of Sulphate.

Tenders, endorsed "Coals," or "Tar and Liquor," as the case may be, to be sent to J. Harrop White, Esq., Town Clerk, Mansfield, on or before the 26th of May, 1903.

Particulars and all other Information from the undersigned.

No Special Form of Tender provided.

The Committee do not bind themselves to accept the lowest or any Tender.

ARTHUR GRAHAM,
Engineer and Manager.

Gas-Works, Mansfield,
May 6, 1903.

BOROUGH OF LONGTON.

(GAS AND ELECTRICITY DEPARTMENT.)

TENDERS FOR TAR.

THE Gas and Electricity Committee invite TENDERS for the purchase of their surplus TAR during Twelve Months ending June 30, 1904.

Sealed Tenders, endorsed "Tender for Tar," to be sent in addressed to the Chairman of the above Committee not later than Tuesday, May 26.

The Committee do not bind themselves to accept the lowest or any Tender.

W. LANGFORD,
Engineer and Manager.

May 1, 1903.

SKIPTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TAR.

THE Council invite Tenders for the purchase and removal of surplus TAR produced at the Skipton Gas-Works, between June 30, 1903, and July 1, 1904.

Probable quantity, 400 tons.

The Council reserve the right to let the Contract in one or more lots.

Further Particulars may be obtained from Mr. J. H. Woodward, Gas-Works, Skipton, to whom Tenders, endorsed "Tar," are to be sent before Wednesday, May 27, 1903.

RICHARD WILSON,
Clerk to the Council.

Skipton, May 15, 1903.

SKIPTON URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Council invite Tenders for the supply of about 600) tons of Best Screened GAS COAL, to be delivered free at the Railway Station, Skipton, or at the Council's Siding adjoining the Gas-Works on the Leeds and Liverpool Canal, between June 30, 1903, and July 1, 1904, in monthly quantities.

No Form of Tender issued.

Further Particulars as to periods and quantities of deliveries, &c., may be obtained from the Manager, Mr. J. H. Woodward, Gas-Works, Skipton, and Tenders endorsed "Tender for Gas Coal," are to be sent to him on or before Wednesday, May 27, 1903.

The lowest or any Tender not necessarily accepted.

RICHARD WILSON,
Clerk to the Council.

May 15, 1903.

BUXTON URBAN DISTRICT COUNCIL.

TENDERS FOR TAR AND LIQUOR.

THE Gas Committee invite Tenders for the purchase of the surplus TAR and LIQUOR produced at their Works in Ashwood Dale, Buxton, for One Year commencing from the 30th of June next.

Forms of Tender and other Particulars may be obtained of Mr. H. Barker, Engineer, Town Hall, Buxton.

Sealed Tenders, endorsed "Tenders for Tar and Liquor," to be addressed to the Chairman of the Gas Committee, and delivered not later than Saturday, June 13.

The Committee do not bind themselves to accept the highest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

BUXTON URBAN DISTRICT COUNCIL.

TENDERS FOR CANNEL.

THE Gas Committee invite Tenders for the supply of 3000 Tons of CANNEL, to be delivered at their Siding, on the Midland Railway, in Ashwood Dale, Buxton, during the Year ending the 30th of June, 1904.

Forms of Tender and other Particulars may be obtained of Mr. H. Barker, Engineer, Town Hall, Buxton.

Sealed Tenders, endorsed "Tenders for Cannel," to be addressed to the Chairman of the Gas Committee, and delivered not later than Saturday, June 13.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
JOSIAH TAYLOR,
Clerk.

ASHTON-IN-MAKERFIELD URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS.

THE above-named Council invite TENDERS for the supply of the following materials between the 1st of July, 1903, and the 30th of June, 1904—viz.:

3000 Tons of GAS COAL or NUTS, screened.
Galvanized STEAM TUBING and FITTINGS.
Dry Ordinary METERS.
Dry Prepayment METERS.
Cast-Iron LAMP COLUMNS, CRADLES (Welded Joints), and Copper LANTERNS.
3-inch and 4-inch Socket and Spigot Cast-Iron PIPES and SPECIALS, coated.
Brass MAIN COCKS

Also for the purchase of all surplus TAR and AMMONIACAL LIQUOR made at the Gas-Works between the dates before mentioned.

Further Information and Forms of Tender, may be had on application to Mr H. Niven, Engineer and Manager, Gas-Works.

Sealed Tenders, endorsed "Gas," to be delivered at the Clerk's Office, Council Offices, Ashton-in-Makerfield, not later than the 2nd of June, 1903.

The lowest or any Tender not necessarily accepted.

ALBERT SYKES,
Clerk to the Council.

Council Offices, Ashton-in-Makerfield,
May 15, 1903.

LURGAN GASLIGHT AND CHEMICAL COMPANY, LIMITED.

THE Directors invite Tenders for the supply of 3500 Tons of best quality Screened GAS COAL, delivered into the Works at Lurgan, or placed on Lighters or on Rail at Belfast.

The Coal must be delivered in such quantities and at such times as the Directors may fix; but a large proportion can be taken before the 1st of November. Each cargo to be accompanied by a Certificate as to place of origin.

Tenders (in sealed envelope), accompanied by reference to Gas-Works using the Coal offered, should reach me not later than 10 a.m., on Monday, the 1st of June, 1903.

The Directors do not bind themselves to accept the lowest or any Tender.

FRED. W. MAGAHAN,
Secretary.

Gas-Works, Lurgan,
May 4, 1903.

SWADLINCOTE DISTRICT URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

THE Gas Committee of the above Council are prepared to receive TENDERS for the surplus TAR and LIQUOR made at their works during the Twelve Months ending the 30th of June, 1904.

The Tar and Liquor will be loaded into the Contractor's Tanks at the Gas-Works.

Tenders, stating price per ton per degree Twaddle at 60° for Liquor, and at per ton for Tar.

Payments net cash monthly.

Further Information from G. B. Smedley, Engineer, and Manager.

The Committee do not bind themselves to accept the highest Tender.

Sealed Tenders, endorsed "Tar" or "Liquor," to be sent in not later than Twelve noon, May 26, 1903, to

W. A. MUSSON,
Clerk to the Council.

Swadlincote, May 12, 1903.

SWADLINCOTE DISTRICT URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Council invite Tenders for the supply of 4500 Tons (more or less) of best screened GAS COAL, to be delivered in such quantities as may be required between the 30th of June, 1903, and the 30th of June, 1904.

All Particulars and Form of Tender may be obtained from Mr. G. B. Smedley, Engineer and Manager, on receipt of stamped addressed envelope.

Tenders, which must be on the prescribed Form and accompanied by analysis, must be delivered to me at my Office on or before the 26th of May, 1903, endorsed "Tender for Gas Coal."

The Council do not bind themselves to accept the lowest Tender.

W. A. MUSSON,
Clerk to the Council.

Council Offices, Swadlincote,
May 12, 1903.

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR CANNEL AND COAL.

THE Gas Committee invite Tenders for the supply and delivery of 1400 Tons of CANNEL and 14,600 Tons BEST SCREENED GAS COALS, or such quantity as may be required for the Gas-Works at Sowerby Bridge and Luddenden Foot during the period of Twelve Months from the 1st of June, 1903, to the 31st of May, 1904.

Tenders will be received for the whole or any portion of the above quantity.

Specifications, Form of Tender, and all Information can be obtained on application to the Engineer, Mr. A. W. Bissell, Gas-Works, Sowerby Bridge.

The Gas Committee reserve the right to accept Tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, to be delivered not later than Twelve o'clock noon on Monday, May 25, 1903 (endorsed "Tender for Coal" or "Cannel"), to

R. W. EVANS,
Solicitor and Clerk to the Council.

Commercial Bank Chambers, Halifax,
May 8, 1903.

GLOUCESTER GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 33,000 Tons of GAS COAL for One Year from the 1st day of July next, in such monthly quantities as may be required by the Company.

Tenders to state the price delivered at the Midland Railway Sidings, Hempsted, near Gloucester, or the Great Western Railway Wharf, Llanthony, Gloucester; or if sent (as preferred) by Water, the price f.o.b., and also the price delivered at the Gas Company's Wharf on the Gloucester and Berkeley Canal.

Further Particulars and Forms of Tender may be obtained of the undersigned.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than Monday, the 1st day of June next.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
WILLIAM E. VINSON,
Secretary.

Gas Offices, Gloucester,
May 8, 1903.

EXMOUTH GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Exmouth Gas Company invite TENDERS for 5000 Tons of Clean, Unscreened (through and through), First-Class Durham or any other good GAS COAL, to be shipped in such quantities (by sailing vessels only) and at such times as may be required, commencing from the 1st of July next.

Tenders to be accompanied by practical working analysis; and prices may be quoted c.i.f. or f.o.b at Exmouth Docks.

Sealed Tenders to be sent to the undersigned, addressed to the Chairman of the Company, and endorsed "Tender for Coal," not later than Saturday, the 30th day of May, 1903.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender (no special Form of Tender issued).

By order,
JAMES T. FOSTER,
Secretary and Manager.

Gas-Works, Exmouth,
May 9, 1903.

CORPORATION OF NOTTINGHAM.

(GAS DEPARTMENT.)

TENDERS FOR COALS.

THE Gas Committee are desirous to receive OFFERS for the supply of 25,000 Tons of COALS, COBBLES, or NUTS for the period terminating the 30th of June, 1904.

The large Coals and the Cobbles or Nuts are to be separately delivered, where and as from time to time directed, by and at the expense of the Contractors, upon the Gas-Works Siding, Great Northern Railway, in the East Croft at Nottingham, and also on the Gas-Works Sidings, Midland Railway, at Radford and Basford respectively; and at and after the rate of one-eighth part of such total quantity in each calendar month, commencing with the month of July next, till the Corporation shall be satisfied with the amount of accumulated Stock, and afterwards at such rate as shall be from time to time directed, till the agreed quantity shall have been delivered.

The Coals, Cobbles, or Nuts are to be the best of their respective kinds, freshly wrought and well screened (description, sizes, and inclination of screen to be specified), to be as free as possible from sulphur, bats, bind, refuse, and dirt, and shall be weighed (20 cwt. to the ton), upon the Corporation Machines, or upon such other Machines as may be mutually agreed upon.

Payments will be made Monthly, if and so long as the Contract shall be duly fulfilled.

The Corporation do not bind themselves to accept the lowest or any Tender.

Further Information and Forms on which the Tenders must be made may be obtained on application to me, at the General Manager's Office; and the Tenders (sealed) specifying the description of Coals, the Seam, and the Pits at which they are to be raised, and stating the prices for deliveries at the several places and in manner and subject to the conditions aforesaid, must be delivered to Sir Samuel George Johnson, Kt., Town Clerk, by the first post on Monday, the 25th day of May, 1903.

By order.
JAMES HERBERT BROWN.
Engineer and General Manager.

Corporation Gas Offices,
George Street, Nottingham,
May 14, 1903.

WAKEFIELD GASLIGHT COMPANY.

MINIMUM PRICE £110 PER CENT.

SALE BY TENDER OF £20,000 FOUR-AND-A-HALF PER CENT. PREFERENCE STOCK.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £20,000 of the above PREFERENCE STOCK, to be paid up in full on or before the 1st of July next, such Stock being a portion of Additional Capital authorized to be raised by Resolution passed at an Extraordinary General Meeting of the Shareholders held on the 5th day of May, 1903, pursuant to Section 11 of the Wakefield Gas Act, 1877.

Dividends at the rate of £11 10s. per centum per annum have been paid on the Original Shares for the last Fourteen Years.

Particulars and Conditions of Sale and Form of Tender may be obtained on application at this Office; and sealed Tenders must be sent in not later than Monday, the 8th day of June, 1903.

By order of the Board,
W. H. PARKER,
Secretary.

Gas Office, Warrengate,
Wakefield, May 5, 1903.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

TO THE SHAREHOLDERS.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company will be held at the Offices, 60, Gracechurch Street, London, E.C., on Thursday, the 4th of June, 1903, at Twelve o'clock Noon, for the purpose of receiving the Report of the Directors and the Accounts for the Year ended the 31st of March, 1903, and for the transaction of the General Business of the Company.

One of the Directors, Mr. Basil Thomas Makins, retires from office, and offers himself for re-election.

The Auditors, Mr. Robert Hesketh Jones and Mr. Thomas Guyatt, retire, and offer themselves for re-election.

The TRANSFER BOOKS WILL BE CLOSED from the 21st of May until the day of the Meeting, both days inclusive.

By order,
A. W. COOPER,
Secretary.

60, Gracechurch Street, E.C.,
May 12, 1903.

OXFORD GASLIGHT AND COKE COMPANY.

THE Directors invite Tenders for the Supply of about 33,000 Tons of Best Screened GAS COAL to be delivered to their Siding, G.W.R., during the Year ending June 30, 1904.

Tenders, addressed to the Chairman of the Oxford Gaslight and Coke Company, and endorsed "Tender for Coal," to be delivered by June 6, 1903.

By order,
JAMES ELDRIDGE,
Engineer and Manager.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTHEND GAS COMPANY.

NEW ISSUE OF £5464 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION at the Mart, E.C., on Tuesday, May 26, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.

NEW ISSUE OF £3000 CONSOLIDATED ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 26, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

LOWESTOFT WATER AND GAS COMPANY.

SALE BY AUCTION OF 400 ADDITIONAL ORDINARY £10 SHARES.

Ranking for 7 per cent., the Dividend on similar Shares in the Company having been 5¾ per cent. for several years past; also

£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, London, E.C., on Tuesday, May 26, at Two o'clock, in Lots, by order of the Directors.

The Company, incorporated in 1853, supplies Water and Gas in Lowestoft and the surrounding district. The Water-Rental in 1891 was £7146; in 1902, it exceeded £14,000; and the Gas Consumption has advanced from 43 million cubic feet in 1891 to upwards of 73 millions in 1902. New Works to keep pace with the increasing demand for Water and Gas are necessary; and it is for these Works that the new Capital is being raised.

Particulars of Sale, and Form of Instructions for the Auctioneer or Secretary to purchase for Investors unable to attend the Auction, obtainable post free of the SECRETARY of the Company, 137, London Road, LOWESTOFT, and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

HASTINGS AND ST. LEONARDS GAS COMPANY.

NEW ISSUE OF £10,000 NEW ADDITIONAL 5 PER CENT. ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 9, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

WEST HAM GAS COMPANY.

NEW ISSUE OF £15,000 CONSOLIDATED ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, June 16, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

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VOL. LXXXI.

OF THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, &c.

Containing the Thirteen Numbers issued during the Three Months, January to March last, together with the Thirteen Plates referring to the New Granton Works of the Edinburgh and Leith Gas Commissioners, and many Photographic Illustrations.

WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

Incorporated by the Wadhurst Gas Act, 1902.

The

WADHURST, TICEHURST, & DISTRICT GASLIGHT & COKE COMPANY.

Under the Company's Act power has been obtained to purchase the Gas-Works situated at Ticehurst, established in 1868.

SHARE CAPITAL £25,000,

In 5000 Shares of £5 each.

The liability on the Shares is limited to £5 per Share.

ISSUE at par of 3500 SHARES.

Ranking for Dividend up to 10 per cent.

A dividend of 4½ per cent. will be guaranteed by the vendor for one year from the 1st of June, 1903, pending the laying of a new trunk gas-main to connect up Ticehurst with Wadhurst, also the laying of distributory gas mains and the enlarging of the gas-works at Ticehurst. These improvements, it is estimated, will take nine months to complete.

Payments—£1 10s. per share on application.
£1 10s. per share on allotment.
And the balance by calls of £1 per share.

THE COMPANY'S BANKERS:
Messrs. Barclay and Co. (Ltd.) Old Bank, Lewes, Sussex.

The list will open on Wednesday, the 20th day of May, and will close on or before Monday, the 25th day of May, 1902.

PROSPECTUS.

The Company's Act of Parliament received the Royal Assent on the 23rd June, 1902, and passed both Houses of Parliament as an unopposed measure. The preamble states:—

"Whereas there is no adequate supply of gas to the parish of Wadhurst, in the county of Sussex, and certain other parishes and places adjacent thereto, and it is expedient that a supply of gas should be afforded to the inhabitants of those parishes and places."

Section 6 provides:—

"The limits of this Act for the supply of gas shall be the parishes or places of Wadhurst, Ticehurst, Burwash, Salehurst, Hurst Green, and Etchingham, in the county of Sussex. Provided that the Company shall not exercise the powers of this Act in the parish of Salehurst without having obtained the written consent of the Rural District Council of Ticehurst"

The Directors invite applications at par for 3500 Ordinary shares of £5 each (ranking for dividend up to 10 per cent.).

Section 10 of the Act provides that the borrowing powers are limited to £ 000 in respect of the authorized share capital of £25,000.

Wadhurst and Ticehurst are large parishes in the Ticehurst Union. The rateable value of the Gas Company's area is £61,439, and population 11,313. These parishes are situated about 40 miles from London, 10 miles from Tunbridge Wells, and 20 miles from Hastings. The railway stations are Ticehurst Road, Etchingham, Robertsbridge, and Wadhurst, on the Tonbridge and Hastings line of the South-Eastern Railway Co. Owing to the great natural beauty of the woodlands and other scenery, the district offers exceptionally fine positions for the erection of country residences, many of which already exist, and there is an increasing demand for land for building purposes.

The old-established gas-works at Ticehurst will be acquired by this Company. The former Company paid dividends for many years on their capital, those for the last ten years being at the following rates:—

1893	5 per cent.	1898	5 per cent.
1894	5 ,,	1899	5 ,,
1895	5 ,,	1900	4 ,,
1896	5 ,,	1901	4 ,,
1897	5 ,,	1902	4 ,,

In addition to the dividends paid, improvements have been made to the gas-works from time to time, and paid for out of profits.

A Map is enclosed with the Prospectus, showing the Company's area of supply, the existing mains and gas-works, and proposed extensions. With a view of future developments in the South-Eastern district, powers have been obtained under the Act for acquiring an additional gas site.

Amongst the customers supplied at Ticehurst may be mentioned one whose consumption for the year was over one-and-a-half million cubic feet of gas, and another, for the same period, at Wadhurst about one-and-three-quarter million cubic feet.

Under an agreement entered into and dated May 8th, 1903, the Company will acquire all mains, lamps, lanterns, burners, stoves, meters as fixed, tools, stock-in-trade, chattels, goods, &c., the benefit of all contracts, covenants, engagements, and that freehold piece or parcel of land situate in Ticehurst, being the site of the gas-works, together with the gas-works, gasholders, retorts, retort-house, purifiers stores, cottage, and all other buildings and plant erected thereon.

With a view of economical management, Wadhurst and other places *en route* will be supplied from the gas-works at Ticehurst, which are being enlarged by the erection of an additional gasometer and tank, and other improvements made. The private gas-works at Wadhurst will be discontinued when the Company's mains are laid for supplying this part of the district, the Company having purchased the whole of that plant and the benefit of existing contracts.

The Company's Act is a very favourable one, as it contains no clause giving the local authority power of purchase, or sliding scale as to the regulation of dividends.

In making their issue of capital, the Directors would point out the sound nature of gas companies' shares as permanent investments, and as an illustration of other gas companies' shares in Sussex and Kent, the following may be mentioned:—

	£		Price. £	Premium. Per Cent.
Lewes Gas Company..	100	Stock	205	10
Brighton and Hove General Gas Co. ..	100	,,	212	112
Maidstone Gas Co. New Ordinary	100	,,	201	101
Tunbridge Wells Consolidated "C" Stock	100	,,	175	75
Andover Gas and Coke Co.	10	Shares	18 10s.	85
Eastbourne Gas Co. "A"	10	,,	32	220

A reprint of articles which have appeared in the "Sussex Daily News" and the "Surrey Advertiser," giving interesting particulars of the Company's district, is enclosed with Prospectus.

Prospectuses and Forms of Application may be obtained at the Company's offices, the Gas-Works, Ticehurst, Sussex, or their bankers, Messrs. Barclay and Co. (Limited), Old Bank, Lewes, Sussex; Head Office, 54, Lombard Street, London, E.C.; and Branches. A copy of the Wadhurst Gas Act, 1902, can be inspected at the Offices of the Company's Solicitors, and also a copy of the agreement, dated the 8th day of May, 1903, which has been entered into by the Company; the consideration money of £16,250, payable under such agreement includes the purchase at a profit of the freehold land and gas-works, situated at Ticehurst, the improvements being made to the gas-works, the costs of obtaining the Act of Parliament, also the issuing and guaranteeing of part of the Company's capital, &c.

Applications for shares should be made on the form enclosed with the prospectus, and forwarded to Messrs. Barclay and Co., Limited, with the amount of deposit —viz., £1 10s. per share. Where no allotment is made, the deposit will be returned in full, and in the case of a partial allotment, the balance of the deposit will be applied towards subsequent instalments.

DIRECTORS.

Colonel Henry O. Currie, Rosemount, Maresfield, Sussex.

Edmund Eaton, Battenhurst Park, Ticehurst, Sussex.

William Robert White, M.D., Highfield, Wadhurst, Sussex.

Charles Wheeler, Welstrode, Lingfield, Surrey.

BANKERS—Messrs. Barclay and Co., Limited, Old Bank, Lewes, Sussex.

SOLICITORS—Messrs. Atkens and Andrews, Wadhurst, Burwash, and Heathfield.

AUDITORS—Messrs. W. B. Keen and Co., Church Court, Old Jewry, E.C.; Messrs. Baker and Davis, London, Tunbridge Wells, and Hastings.

SECRETARY—Mr. Owen Walker.

Company's Offices—The Gas-Works, Ticehurst, Sussex.

8th May, 1903.

This Form may be used.

THE

WADHURST, TICEHURST, and DISTRICT GAS LIGHT and COKE COMPANY.

Incorporated by the Wadhurst Gas Act, 1902.

To the Directors of the Wadhurst, Ticehurst, and District Gaslight and Coke Company, Ticehurst, Sussex.

Gentlemen,—I hereby apply for Ordinary Shares of £5 each, ranking for dividend up to 10 per cent. at par, in the Wadhurst, Ticehurst, and District Gaslight and Coke Company, and I agree to accept the same, or any less amount that may be allotted to me, in accordance with the Company's Prospectus, dated 8th May, 1903.

I herewith enclose £ s. d., being a deposit of £1 10s. per share on the number applied for, and I undertake to pay the balance due on such shares, or on so many thereof as may be allotted to me, in accordance with the terms of the Company's Prospectus.

Usual Signature.....

Name (in full) .....
(and if Miss or Mr.)
Address (in full) .....

Description .....

Dated .....day of .....1903.

47, FARRINGDON ROAD, E.C.

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THE GAS APPLIANCES COMPANY, LIMITED.

THE LEASE OF THE ABOVE PREMISES WILL ALSO BE OFFERED.

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The above stock is all fresh, recently purchased, and in good order, is deserving the special attention of the Trade, being good patterns and well assorted, and will be sold in convenient lots.

Catalogues are being prepared, and may be obtained at the above address free, or from the Auctioneers, Loughborough.

Sale will commence each day at Twelve o'clock prompt.

The Premises are held on Lease, are extensive, and at a very moderate rental.

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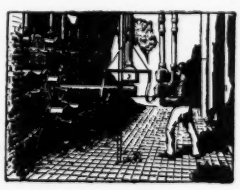

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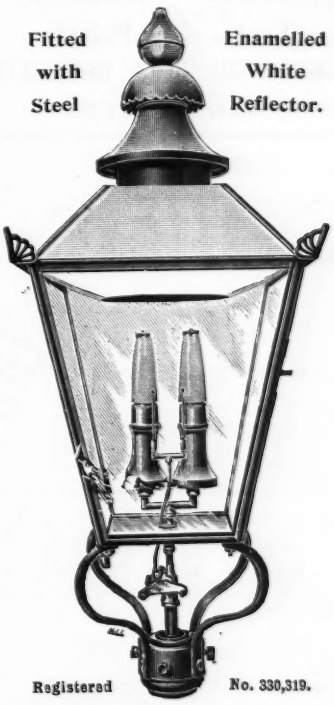

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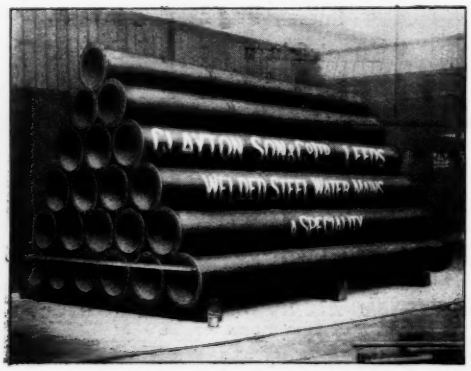

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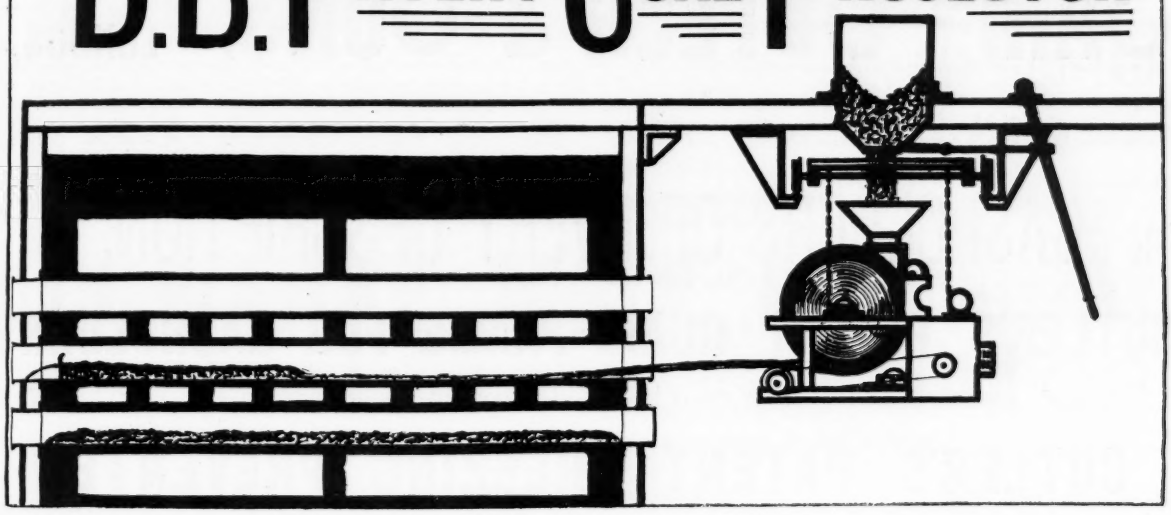

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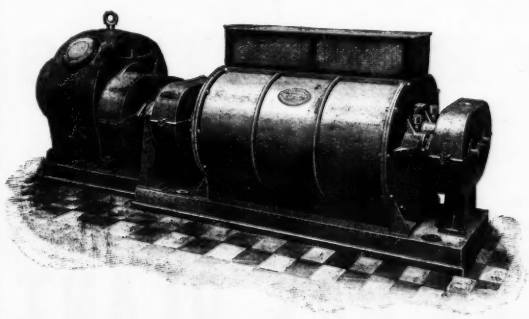

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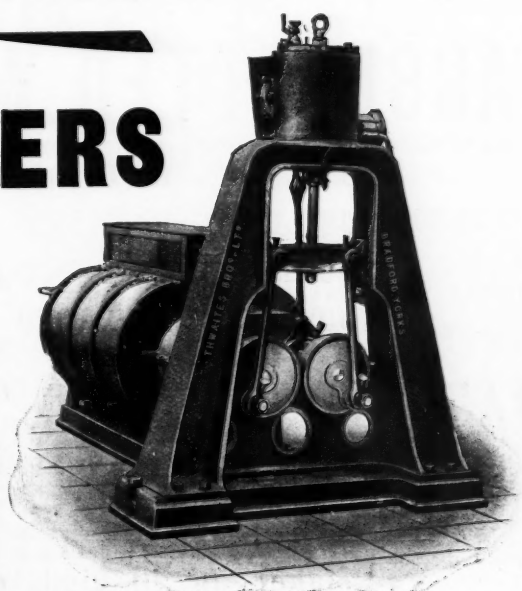

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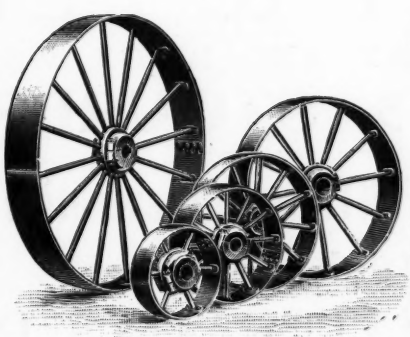

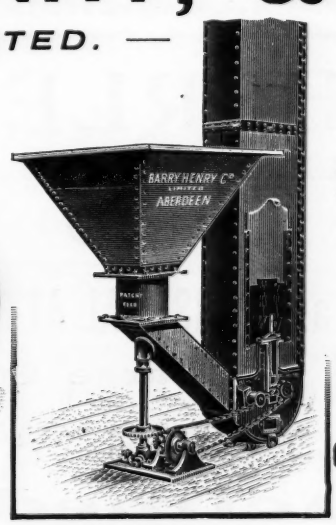

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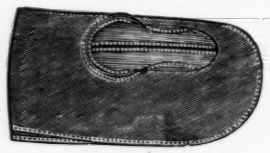

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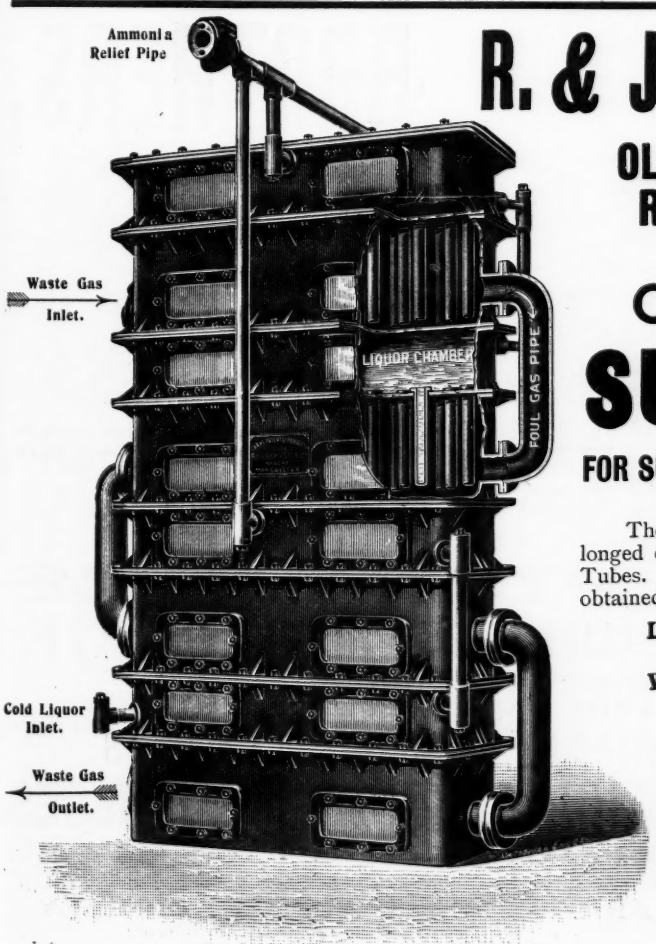

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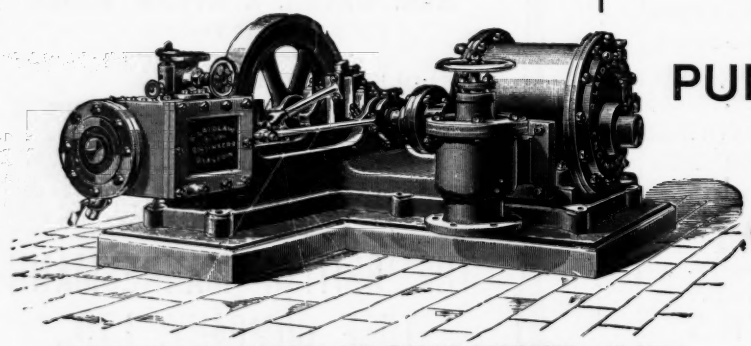

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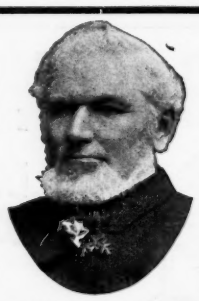

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Printed fo WALTER KING by King, Sell, & Olding, Ltd.; and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, May 19, 1903.